VOL. LXXX PART TWO

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

FEBRUARY 1955

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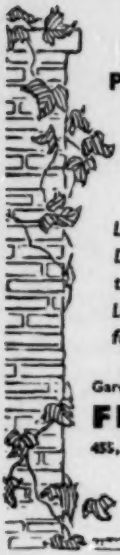

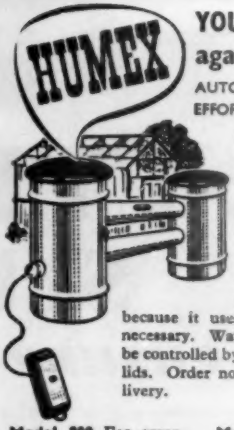

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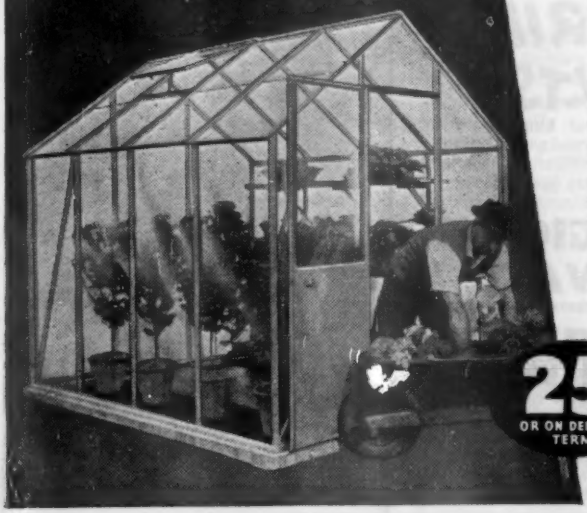

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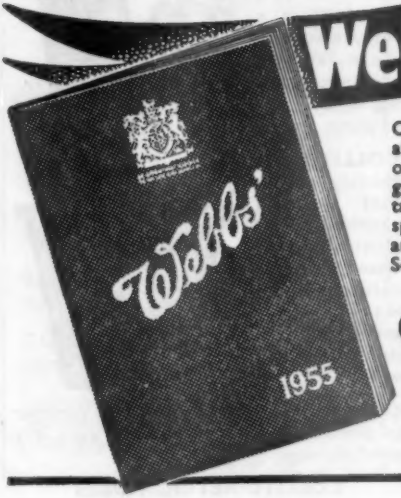

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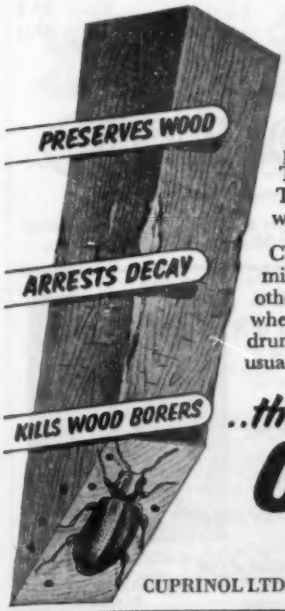

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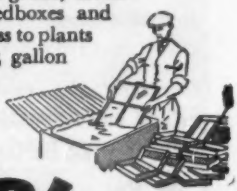

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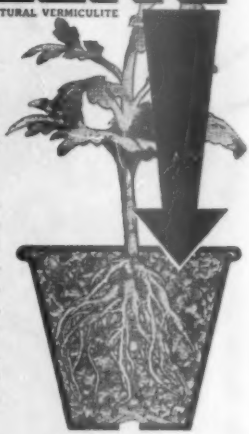

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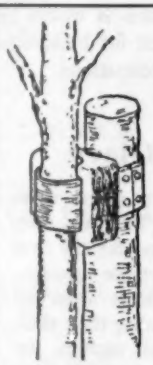

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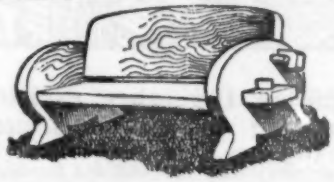

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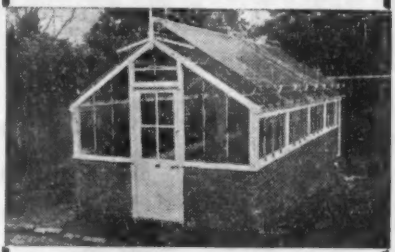

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REPORT OF THE COUNCIL OF

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FOR THE YEAR 1954

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AT 3 P.M. ON TUESDAY, FEBRUARY 22, 1955

REPORT OF THE COUNCIL OF
THE ROYAL HORTICULTURAL SOCIETY

THE Society celebrated in 1954 the 150th anniversary of its foundation and the October issue of the JOURNAL was devoted to the account of the celebrations to commemorate this event. That issue not only contained fairly complete details about the various celebrations but also a history of the Society written by the Deputy Secretary, and a review of the progress of garden design over the past 150 years by Mr. Geoffrey A. Jellicoe, F.R.I.B.A.

The Society was greatly honoured by Her Majesty Queen Elizabeth The Queen Mother, who graciously came to the function at Wisley and opened the new Hostel and Restaurant there.

A simple but impressive ceremony on July 27, at which representatives of Learned Societies and other Associations of similar aims to our own presented Addresses of Congratulation to the Society, will be a lasting and treasured memory in the minds of those who were privileged to be present. Above all, however, the roll of Societies and famous men who took part in this ceremony showed the firm and eminent position which our Society holds in the world of learning.

The Show held on July 27 and 28 was of especial interest as not only had the exhibitors of flowers and plants produced a more than usually beautiful display in the New Hall to mark the celebration of the Society's sesquicentenary, but a most interesting exhibition of the Society's treasures was staged on July 28 in the Old Hall and kept open for a further two days. There were displayed the illuminated addresses presented to the Society at the function on Tuesday, July 27, examples of rare and beautiful books from the Lindley Library, plant drawings, portraits and medals. Of particular interest was the collection of autographs of the Society's Royal Patrons from Queen Charlotte, wife of King George III, down to those of King George VI and Queen Elizabeth The Queen Mother. A special catalogue was printed as a memento of this exhibition.

The Council is glad to be able to report that the number of Fellows is still increasing as is shown by the table given in the Appendix to this report, and it is clear that the Society continues to fill a useful place in the life of the nation.

Hostel and Restaurant—The centenary of our Society was celebrated by the building and opening of the Old Hall. Since that date the major buildings which have been constructed by the Society are the Laboratory at Wisley and the New Hall in Greycoat Street, and now to celebrate the 150th anniversary the new Hostel and Restaurant has been built at Wisley. The Hostel, called Aberconway House in memory of the late President of the Society, is designed to accommodate thirty-six students to satisfy the demand for training at Wisley which has been referred to in previous reports. The Restaurant which is incorporated in this Hostel fills a great need in the Gardens and even in the short time in which it has been open has proved popular. The demand has

been so great, in fact, that it was found possible to extend the service from teas to hot lunches and it is hoped that next year many visitors to the Gardens will avail themselves of these improved catering arrangements.

The Council has taken the opportunity at the same time to provide a small staff canteen where members of the staff can obtain a hot midday meal at a cheap rate. It is confident that Fellows of the Society will approve of its action in providing this amenity for the staff, many of whom found it impossible to get that warm midday meal which is so desirable, especially in cold weather. This innovation is much appreciated and at present some thirty lunches are served to the staff each working day.

The building was designed by Messrs. Sydney Tatchell, Son and Partners to conform with certain specifications laid down by the Ministry of Agriculture and Fisheries and the Ministry of Works. The restrictions thus imposed kept the sizes of the rooms, especially the students' bedrooms, down to certain limits which, although adequate, are not ideal. The architects are to be congratulated on designing a building which serves its purpose so well within these limitations both in dimensions and material used in construction.

Shows—The Chelsea Show was held in one of the few good spells of weather experienced this year. On the Tuesday morning the Show was honoured by a visit by Her Majesty Queen Elizabeth The Queen Mother, accompanied by H.R.H. Princess Margaret and many other members of the Royal Family. The Show was fully up to the standard of previous years and as usual was attended by a large number of Fellows and visitors both from home and overseas.

The Great Autumn Show, which was revived in 1953, was in 1954 staged at the National Hall, Olympia, as it was impossible to find room in our own Halls for the number of exhibits which the trade wished to place before the Fellows and the public. The building at Olympia is not ideal for a flower show, but the display was very colourful, especially when viewed from the balcony, and many excellent exhibits of flowers, fruit and vegetables were staged. Although the attendance was fairly satisfactory it was not up to that of the pre-war years and it is hoped that all Fellows will make a point of visiting this show when it takes place again at Olympia in 1956 and will also draw the attention of their friends to it. It is unfortunate that owing to previous commitments at Olympia it is not possible for us to hire this hall oftener than every other year.

The usual number of Fortnightly Meetings was again held in the Halls. The shows maintained a very high level and there were many exhibits both interesting and instructive. Many meritorious new plants were exhibited.

The usual full programme of Meetings will be held in 1955 in the Halls. Chelsea Show will be held on May 25, 26 and 27, preceded by a Private View for Fellows and Associates on Tuesday, May 24. The Great Autumn Show will be held in the Society's Halls on September 20 and 21.

An interesting programme of lectures has again been arranged and the Council is glad to announce that Professor R. H. Stoughton has kindly consented to give the Masters Memorial Lecture on the subject of "Light and Plant Growth." Numerous competitions and comprehensive programmes for the Fruit, Lily and Rhododendron Groups have been arranged. Full particulars of these Groups and their activities can be obtained on application to the Secretary.

Wisley Gardens—The area under cultivation continues to expand not only in size but, we believe, in scope and interest as well, for although 1954 was a very wet year a record number of visitors entered the Gardens. From September 1, 1953, until August 31, 1954, 139,957 visitors came to the Gardens compared with 125,632 during the previous twelve months.

During the winter of 1953–54 the major undertaking was the overhauling and replanting of the tree and shrub borders in Seven Acres. Here can be now seen many outstanding plants of comparatively recent introduction. Similar treatment was given to the Herbaceous Border, the entire collection of perennials being lifted and rearranged. These operations were principally accomplished by the new group of students.

The spring months were notable for the display of miniature narcissi in the Alpine Meadow and in the Wild Garden. In the latter area the wet season suited the cultivation of primulas of the Petiolares section, and of meconopsis, both of which flowered well. Primulas, particularly the Candelabra species and varieties, are also flourishing, seeding themselves with great abundance on Battleston Hill, where during July and August, the recently extended plantings of lilies were the outstanding feature in the Gardens. This area continues to be developed and many rhododendron and azalea hybrids, raised at Wisley during recent years, have been planted on that part of the Hill facing the Portsmouth Road. It is encouraging to note that several of these Wisley raised hybrids, on their first flowering, have proved good enough to have received the Award of Merit.

The severe frosts of February and March caused heavy losses on the Rock Garden. Large-scale replanting, with the object of further extending the period of flowering, has, however, restored this section of the Gardens to its former eminence. Throughout the year the collections of orchids, and of stove and temperate plants stimulated enthusiasm among our visitors.

At the Chelsea Show two exhibits were staged from the Gardens; a collection of hybrid azaleas raised at Wisley and a collection of plants which had been introduced into British Gardens during the 150 years of the Society's history.

To those of the staff whose main concern is the collecting of ripened seeds for the annual distribution of surplus seeds, 1954 proved a most trying year.

As always, many gifts of plants and seeds have been received at the Gardens. Numerous cuttings of varieties of *Camellia japonica* were sent

by Mr. C. S. Hearn of California, by Mr. Ralph Peer of Los Angeles, and by Monsieur M. P. Plantiveau of Nantes. Many lily hybrids came from Messrs. The Oregon Bulb Farm, U.S.A., and from Mr. L. Tuffery, New Plymouth, New Zealand. Mr. Louis Smirnow, Long Island, New York, presented a splendid collection of herbaceous paeonies, Messrs. Jackman of Woking a collection of helianthemums and Messrs. Kibble & Clare of Ascot and Messrs. MacPenny Nurseries, Christchurch, collections of rock-garden plants. Seeds have arrived from many sources, both at home and from overseas, and particularly from the Royal Botanic Gardens of Kew and Edinburgh, whilst, once again, Messrs. Sutton and Messrs. Watkins & Simpson presented the seeds for the Annual Border.

During June, July and August the practical tests for the Examinations for the National Diploma in Horticulture, and for the Teachers of School Gardening, were conducted at Wisley.

Advisory Work—As the number of Fellows, and the number of visitors to the Gardens, increase, so do the requests for advice at the various scientific departments of the Laboratory, either by letter or by personal enquiry. From the nature of these enquiries it is clear that Fellows are increasingly interested in the correct identification of the plants in their gardens and are anxious to keep abreast with modern horticultural practices; that many Fellows' gardens are plagued by pests and diseases; that the problem of weed control and eradication is a very real one; and that the various trials, particularly of flowers, are fulfilling their function of bringing to the notice of the public new varieties available in the trade.

Scientific Investigations—As the Advisory Work increases, so the time available for scientific research decreases. Even so, in the Entomological Department current investigations include experiments on the control of carrot fly, *Psila rosae*, and onion fly, *Delia antiqua*, both of which are serious pests on the Vegetable Trial Ground. Work on the control of the spruce-larch pineapple gall Adelgid, *Adelges abietis*, and the biology of privet thrips, *Dendrothrips ornatus*, continues; these items formed part of the scientific exhibit at the Great Autumn Show.

In the Mycology Department work has continued on the breeding and selection of antirrhinum stocks for resistance to rust disease (*Puccinia antirrhini*) although the weather has been most unfavourable for the production of good seed. An uncommon rust disease, caused by *Cronartium asclepiadeum*, has appeared in the paeony collection and is also being studied.

Floral and Vegetable Trials—The Permanent Floral Trials have been continued as in past years. In the Narcissus Trial, removed to a more open site on the Vegetable Trial Grounds, most of the varieties were in their first year of growth and were not judged; thus few awards were made. Although narcissus mosaic virus was again present it was on a reduced scale due to the vigorous control measures which have been carried out in the past two years. The trials of perennial lupins,

rhododendrons and bearded irises yielded plenty of bloom but the heavy rains of early June damaged many of the iris flowers. It was noticeable that the large-flowered irises of American breeding did not stand up to the inclement weather as well as those of English origin. The Apple Walk did not prove to be a particularly good site for the Delphinium Trial: the trees caused the plants to be rather drawn and out of character and mildew was prevalent. The Sweet Pea Trial was divided into two sections; the bush-grown, planted on the Floral Trial Grounds, suffered badly from scorch, but the cordon-grown, planted on the Vegetable Trial Grounds, was one of the best cordon Sweet Pea Trials seen at Wisley. It was unfortunate that there were no very outstanding new varieties. Border carnations and pinks, gladioli and Michaelmas daisies all flowered freely. The trial of chrysanthemums, increased in size to twelve plants of each variety, was accommodated where for so long the dahlias have been situated—on the Broad Walk leading to Battleston Hill. All plants bloomed freely and some novelties were quite outstanding. Cold wet weather prevented the dahlias, on their new site, from showing their true worth.

Among the Invited Trials that of *Digitalis* was quite remarkable, two stocks out of the eight entered receiving the First Class Certificate. For six weeks the stately stems of these foxgloves, some 8 feet high, carried a mass of bloom with the flowers held horizontally and spaced all round the inflorescences. The trial of annual chrysanthemums—varieties of *Chrysanthemum segetum*, *coronarium* and *carinatum*—also bloomed over a long period and included some good strains of these valuable annuals. Summer-flowering stocks were disappointing, there being no outstanding strains in the trial; the column-type section of this trial is to be regrown in 1955. Other trials included, in the open ground, sweet williams and varieties and hybrids of *Tulipa fosteriana*, and, under glass, varieties of *Primula malacoides* and *P. sinensis*.

A very useful trial of vegetables was that of spinach. It was sown twice, in the spring of 1953 and in the autumn of 1953; the autumn-sown trial, maturing in the spring of 1954, proved that, at Wisley, it is possible to overwinter in the open both the round-seeded and prickly-seeded varieties. The autumn-sown onion trial, repeated for the third time, demonstrated that the American 'Crystal Wax' varieties do not overwinter satisfactorily in the open at Wisley. An autumn-sown trial of lettuces in the open ground produced a good crop in early May, at the same time as the large trial of radishes was maturing satisfactorily after a slow start due to the cold nights in April. A small trial of shallots was also completed and the Rhubarb Collection was inspected. There were also trials of winter cabbages, parsnips and savoys.

National Fruit Trials—The area occupied by the National Fruit Trials remains the same, about 53 acres, and is visited by a large number of people who are interested in new varieties and in fruit-growing in general. The crop this year was satisfactory and advantage was taken to stage an exhibit at Vincent Square of about 600 varieties.

THE ROYAL HORTICULTURAL SOCIETY

ESTABLISHED 1804 INCORPORATED 1809

NOTICE IS HEREBY GIVEN that the ONE HUNDRED AND FIFTY-FIRST ANNUAL MEETING of the Fellows of the Society will be held in the Old Hall, Vincent Square, Westminster, on Tuesday, February 22, 1955, at 3 P.M. precisely, for the purpose of receiving the Report of the Council for the past year, and electing a President, Vice-Presidents, a Treasurer, two Members of Council, and an Auditor.

By Order of the Council,
C. V. L. LYCETT,
Secretary

THE ROYAL HORTICULTURAL SOCIETY'S OFFICES,
VINCENT SQUARE, LONDON, S.W. 1.
January 25, 1955

ANNUAL MEETING

To be held at 3 P.M., February 22, 1955

AGENDA

Minutes of the last Annual Meeting held on February 16, 1954.
To sign the Minutes.
Report of the Council.
President's Address.
Treasurer's Statement.
Adoption of Report of the Council.
Election of President.
Election of Vice-Presidents.
Election of Treasurer.
Election of Two Members of Council.
Election of Auditor.
Presentation of the Victoria Medals of Honour.
Presentation of a Diploma to an Honorary Fellow.
Presentation of Associate of Honour Badges.
Presentation of Veitch Memorial Medals.
Presentation of the Loder Rhododendron Cup.
Presentation of the Jones-Bateman Cup.
Presentation of the A. J. Waley Medal.
Presentation of the Reginald Cory Memorial Cup.
Presentation of the George Monro Memorial Cup.
Presentation of the Gordon-Lennox Cup.
Presentation of the Lawrence Medal.
Presentation of the Holford Medal.
Presentation of the Sander Medal.
Presentation of the George Moore Medal.
Presentation of the Williams Memorial Medal.

LIST OF NOMINATIONS

The following list of nominations of President, Vice-Presidents, Members of the Council and Officers for election is circulated in accordance with Bye-law 68:

	Proposed by:	*Seconded by:*
As President:		
The Hon. David Bowes-Lyon, V.M.H.	The Hon. Lewis Palmer.	Mr. F. A. Secrett.
As Vice-Presidents:		
Sir Ronald G. Hatton, C.B.E., M.A., D.Sc., F.R.S., V.M.H. Dr. Ernst H. Krelage Dr. E. D. Merrill, F.M.L.S. Mr. F. Cleveland Morgan Mr. B. Y. Morrison Mr. C. G. A. Nix, V.M.H. Colonel The Hon. Sir Heaton Rhodes, K.C.V.O., K.B.E. Sir Edward J. Salisbury, C.B.E., D.Sc., LL.D., F.R.S., F.L.S., V.M.H. Prof. Sir William Wright Smith, M.A., F.R.S., F.R.S.E., F.L.S., V.M.H.	The Hon. D. Bowes-Lyon.	Lord Digby.
As Treasurer:		
The Hon. Lewis Palmer, F.L.S., V.M.H.	Col. F. C. Stern.	Mr. E. P. F. Sutton.
As Members of Council:		
Mr. G. W. Leak, V.M.H. . .	Mr. E. H. Savill.	Dr. H. V. Taylor.
Mr. J. L. Russell	Major A. Pam.	Dr. G. Taylor.
As Auditor:		
Mr. F. G. Feather, F.C.A. . .	Mr. G. L. Pilkington.	Mr. H. G. Hillier.

By Order of the Council,
C. V. L. LYCETT,
Secretary

January 25, 1955

The exhibit occupied a space running the whole length of the Old Hall.

Amongst the most promising of the new varieties fruited for the first time at Wisley during 1954 are three strawberries which, if they maintain their present performance, will meet a much-felt need, as there is a dearth of good strawberries at the present day.

Varieties for test as to their suitability for canning have again been supplied to the Fruit and Vegetable Canning and Quick Freezing Research Association and for "jamming test" to the British Food Manufacturing Industries Research Association. Samples for "cold storage" test have also been sent to Ditton Laboratory.

The two experiments set up in 1950 to combat the damaging effects of spring frosts to fruit blossoms were put into operation again during the spring of 1954 and some interesting results were obtained. A full report may be published in due course.

New varieties are now being propagated for the new site of the National Fruit Trials in Kent where approximately 100 new varieties of apple have already been planted. Most varieties of the soft fruits and some 20 per cent. of the apple varieties have been successfully propagated. Units of soft fruits and tree fruits continue to be supplied to the Experimental Horticultural Stations.

Work on the nomenclature of hardy fruits has continued.

Fruit Department—The Model Fruit Gardens are now fully established and good crops were produced during 1954 in spite of adverse weather conditions. Considerable interest continues to be shown in them and a report on their development appeared in Vol. **78,** part 9 of the JOURNAL.

The trees in the new apple and plum collections adjacent to the Model Fruit Gardens continue to make good growth. Many of the young plum trees already have yielded good crops and some of the apples have also commenced cropping. The "fan-trained" trees along the borders leading to the Apple Collection are also taking shape.

Attendances at the winter and summer pruning demonstrations were again large and appear to increase annually.

School of Horticulture—Thirty student gardeners are now in training at Wisley. In September 1954, seven students completed their two-year course of instruction and six of them gained the Wisley Diploma.

In the Final Examinations for the National Diploma in Horticulture held in 1954, three of the nine successful candidates were ex-Wisley Student Gardeners.

Scholarship—Mr. D. W. Way, the holder of the Scholarship sponsored jointly by the Worshipful Company of Gardeners, the Sir James Knott Fund and the Society, has spent his third and final year at the Agricultural University at Wageningen. Mr. Way was the only candidate—and a successful one—for the N.D.H. Honours Examination of 1954.

Expeditions—An expedition jointly sponsored by the British Museum (Natural History Section) and the Society has been operating in Nepal. It was led by Mr. L. H. J. Williams, a member of the staff of the British Museum, and the other members were Mr. K. H. Hyatt, Mr. J. Quinlan, Mr. J. Stainton and Mr. W. Sykes, a member of the Society's staff at Wisley.

Obituary—The Society and the Council have suffered a great loss in the passing of Mr. E. A. Bowles. Details of his career and his long record of service to the Society were published in the JOURNAL for July 1954. The Council will greatly miss his wise counsel, based on an unrivalled knowledge of plants and a deep appreciation of human nature, fortified by strong moral convictions which would not permit him to countenance any action which he thought was not right.

The Council also regretfully reports the deaths of Mr. R. L. Harrow who was Director of the Society's Gardens from 1931 to 1946; of Lt.-Col. P. Crichton Kay and Mr. Hugh Armytage-Moore, two other holders of the Victoria Medal of Honour; of Dr. J. D. Ruys, an Honorary Fellow of the Society, who died during a visit to this country to attend the celebrations of our 150th anniversary; and of the following Associates of Honour: Mr. J. Hill; Mr. G. F. Johnson; Mr. B. F. Perfect; Mr. J. Thomas; Mr. T. E. Tomalin; Mr. A. E. Usher.

The deaths of the following are also regretfully reported: Mr. F. Barker, Veitch Memorial Medallist; Mr. W. A. Constable, the well-known expert on lilies; Miss E. K. Field, a member of the Lily Committee and horticultural adviser to the National Trust; Mr. Sidney W. Flory, for many years a member of the Orchid Committee; and Mr. C. J. Howlett, a member of Floral Committee A.

Examinations—The normal programme of the Society's Examinations was carried out in 1954. In the General Examinations in Horticulture there were 1,352 candidates, of whom 636 were successful; 163 candidates sat for the Examination for the National Certificate in Elementary Horticulture, and of them 152 were successful, twenty-one having passed with credit. Nine candidates obtained the Teachers' Diploma in School Gardening, nineteen obtained the National Diploma in Horticulture and one obtained the National Diploma in Horticulture with Honours.

Publications—The JOURNAL has been published regularly and has maintained approximately the same size as in 1953 except for the specially enlarged issue which was published in October in connection with the celebrations of the Society's 150th anniversary. As in 1953, the *Proceedings* were published separately in two parts.

Two further parts of the *Botanical Magazine* have been published during the year. These form the first two parts of Volume 170.

The *Daffodil and Tulip*, *Fruit*, *Lily* and *Rhododendron and Camellia Year Books* for 1955 have also been published and the reduction in price in 1953 to 10*s*. has brought an increase in sales. The 1954 issue of the *Rhododendron and Camellia Year Book* has been completely sold out.

The new edition of the *Classified List of Daffodils* has been published. The *Horticultural Show Handbook* has also been reprinted.

Work has continued during the year on the Supplementary Volume to the *R.H.S. Dictionary of Gardening*. It is hoped that this work, together with the new edition of the main volume of the *Dictionary*, may be published during 1955.

Further work has been done on the book on *Asiatic Magnolias in Cultivation* by Mr. G. H. Johnstone. This is now in an advanced stage and should appear early in 1955.

Work is also proceeding on the book on *Snowdrops and Snowflakes* by Col. F. C. Stern, with a chapter by the late Mr. E. A. Bowles, and it is anticipated that we will be able to send this to the printers during 1955.

The International Code of Nomenclature for Cultivated Plants has been reprinted during the year and several new pamphlets have also been published.

Lindley Library—488 books and major pamphlets have been added to the Library during the year (October 1953 to September 1954), notable among them being:

Dictionnaire iconographique des orchidées, 1897–1906, being 826 plates in chromolithograph.

Engler, A. (ed.)—*Das Pflanzenreich*, Heft 107, Teil 2: *Campanulaceae —Lobeloideae*, von F. E. Wimmer. 1954.

Gleason, H. A.—*The New Britton and Brown illustrated flora of the north-east United States and adjacent Canada*. 1952.

Jennings, Otto—*Wild flowers of western Pennsylvania and the Upper Ohio Basin*. 1953. 2 vols.

Oxford English Dictionary (Murray's edition). 1888–1921 and *Supplement*, 1933.

Phillips, H.—*Sylva florifera*. 1823.

Zorn, J.—*Icones plantarum medicinalium centuria I*. 1779.

Gifts, acknowledged with appreciation by the Council, include books, journals, trade lists and manuscripts, the latter including notes by the late Chairman of the Library Committee, Mr. E. A. Bowles, and author's copies of his *My Garden* series.

Further valuable additions have been made to the collection of drawings and prints; five drawings by Miss Dorothy Martin have been lent to the New Zealand Government for exhibition in Auckland during the Festival of Arts held there in May 1954.

Gifts of wartime issues have been received from foreign journals and new journals accepted: binding and recording of sets continues; a further list of our holdings has been contributed to the new edition of *The World List of Periodicals*.

The Subject Catalogue of books, begun in 1953, now contains all books added since January 1953 and some 120 earlier accessions. Publication of the annual List of Accessions will be resumed with one for Accessions of 1954.

Loans to Fellows from other libraries and photocopies from originals in the Library have been provided in greater quantity than last year.

Fellows and Associates have borrowed 3,805 books (4,161 in 1952–3), and 1,769 visitors to the Library signed the Visitors' Book, including overseas Fellows and Dominion and foreign visitors, some of whom brought or sent gifts to mark the Society's anniversary.

Lantern Slides—The lantern slide collection is steadily growing and it is hoped that more sets of 35 millimetre colour slides can be built up to supplement the old type. During the period from September 1, 1953 and September 1, 1954 a total of 110 sets was borrowed, an increase of six over the previous year. Approximately 250 new slides have been added to the collection during this same period. Although there is a demand for cinema film the Society has not entered this field because of the cost of preparation and the difficulties of maintenance.

The Victoria Medal of Honour—The Victoria Medal of Honour, which was established "to enable the Council to confer conspicuous honour on those British Horticulturists, resident in the United Kingdom, whom it might from time to time consider deserving of special honour at the hands of the Society," has been awarded to: The Hon. Lewis Palmer, F.L.S., of Headbourne Worthy Grange, Winchester, Treasurer of the Society, and Professor R. H. Stoughton, D.Sc., of Reading University.

The Veitch Memorial Trust—The awards made under the Veitch Memorial Trust "to those who have helped in the advancement and improvement of the science and practice of horticulture," are as follows: Gold Veitch Memorial Medals to: Mr. George Johnstone, O.B.E., V.M.H., of Grampound Road, Cornwall, for his book *Asiatic Magnolias in Cultivation*; and to Dr. A. W. E. Soysa, O.B.E., F.R.C.P., F.L.S., of Ceylon, for his work in connection with orchids. Silver Veitch Memorial Medal and £25 to Mr. Clarence Elliott, V.M.H., of Moreton-in-Marsh, Glos., for his work in introducing new plants and extending the knowledge of rock-garden plants. Silver Veitch Memorial Medals to: Mr. Howard H. Crane, F.L.S., of Eastcote, Pinner, for his work in connection with *The Fruit Garden Displayed*; to Mrs. G. Knox Finlay, of Methven, Perthshire, for her work in connection with the introduction and cultivation of new plants; and to Mrs. John Renton, of Perth, for her work in connection with the introduction and cultivation of new plants.

Associates of Honour—The Associateship of Honour, which is conferred on "persons of British nationality who have rendered distinguished service to horticulture in the course of their employment," has been conferred on: Mr. H. W. Abbiss, M.B.E., D.C.M., M.M., N.D.H., F.L.S., of Truro; Mr. A. Blackburn, of Ruislip; Mr. W. G. MacKenzie, of the Chelsea Physic Garden; Mr. W. Phillips, Gardener to Mr. F. W. J. Fox, Esq., The Hall, Leighton, Shrewsbury; Mr. H. Prince, of Messrs. Sutton & Sons, Ltd., Reading; and Mr. P. Wiseman, of Messrs. John Waterer, Sons & Crisp, Ltd., Bagshot, Surrey.

The Jones-Bateman Cup, which is offered for award triennially

"for original research in fruit growing which has added to our knowledge of cultivation, genetics or other relative matters," has been awarded to Mr. R. Barrington Brock, M.B.E., B.Sc., F.I.C., of Oxted, Surrey.

The Loder Rhododendron Cup, awarded for work in connection with rhododendrons, has been awarded to Col. The Lord Digby, D.S.O., M.C., T.D., of Dorchester.

The A. J. Waley Medal, which is awarded "to a working gardener who has helped in the cultivation of rhododendrons," has been awarded to Mr. R. W. Rye, Gardener to The Earl of Stair, K.T., D.S.O., V.M.H., Lochinch Castle, Stranraer.

The Reginald Cory Memorial Cup is awarded with the view of "encouraging the production of hardy hybrids of garden origin, to the raiser of a plant that is the result of an intentional cross." Only a hybrid of which one parent is a true species is eligible, and it must have been exhibited at one of the Society's Shows and received an Award during the current year. Hybrids of annuals and biennials do not come within the scope of the Award. This Cup has been awarded to The Royal Horticultural Society, Wisley, for raising *Rhododendron* 'Lascaux,' shown on June 15 (Fig. 15).

The Sander Medal, "for the best new greenhouse plant of general utility shown to the Society during the year," has been awarded to Shenley Hospital, St. Albans, who exhibited *Kalanchoe* 'Vivid' on May 25.

The George Moore Medal, "for the best new cypripedium shown to the Society during the year," has been awarded to Messrs. R. & E. Ratcliffe, Chilton, Didcot, for *Cypripedium* (Gorse G.) 'Chilton,' shown on February 16.

The Lawrence Medal, "for the best exhibit shown to the Society during the year," has been awarded to Messrs. Konynenburg & Mark, Noordwyk, Holland, for an exhibit of gladioli on August 10 (Fig. 18).

The Williams Memorial Medal, "for the best group of plants and/or cut blooms of one genus (fruit and vegetables excluded) which show excellence in cultivation, staged at one of the Society's Meetings during the year," has been awarded to Messrs. Blackmore & Langdon of Bath, for an exhibit of polyanthuses and primroses on April 27 (Fig. 17).

The Holford Medal, "for the best exhibit of plants and/or flowers (fruit and vegetables excluded) shown by an amateur during the year in the Society's Halls," has been awarded to The Commissioners of Crown Lands, Windsor Great Park, for an exhibit of shrubs on October 19.

The George Monro Memorial Cup, awarded "for the best exhibit of vegetables shown by an amateur during the year," has been awarded to Col. E. J. S. Ward, M.V.O., M.C., of Hungerford (Gardener Mr. H. J. Dodson) for his exhibit on October 19 (Fig. 19).

The Gordon-Lennox Cup, "for the best exhibit of fruit shown by an amateur during the year," has been awarded to St. John's College, Cambridge, for an exhibit of grapes, apples and pears on November 2.

Council—The vacancy on the Council caused by the death of Mr. E. A. Bowles has been filled by the election of Sir Giles Loder, Bt. Under Bye-law 54 three members of Council who have served longest since they were last elected retire. The retiring members this year are Lord Digby, the Hon. Lewis Palmer and Mr. G. W. Leak. The Council is glad to report that Mr. Lewis Palmer has agreed to allow his name to be put forward for re-election as Treasurer at the Annual General Meeting. Under Bye-law 54 if this choice is approved by the Annual General Meeting Mr. Palmer is automatically thereby re-elected to the Council. The Council has also exercised its prerogative under the same Bye-law and has asked Mr. Leak to stand for re-election to the Council next year and he has kindly consented to allow his name to go forward. The Council wishes to express its appreciation for the services rendered to the Society by Lord Digby who has kindly consented to continue to serve on those Committees of which he is a member.

Committees, Judges, Examiners and Lecturers—The Council once again wishes to render its sincere thanks to the many Fellows who have given the Society so much of their time in serving on the various Committees or as judges, examiners and lecturers. The Society could not carry on its work without the many and varied services which have been so freely given by all these Fellows.

The Press—The Council records its appreciation of the support and help which the Society constantly receives from the Press.

Staff—Dr. H. R. Fletcher has been appointed Assistant to the Regius Keeper of the Royal Botanic Garden, Edinburgh, and it is with great regret that the Council has to report that he has accordingly tendered his resignation as Director of the Society's Gardens as from the end of the year. Dr. Fletcher has rendered the Society signal service in his conduct of the Gardens at Wisley, where he has introduced many reforms and has been largely responsible for the smooth way in which the new Hostel has begun to function. During his service with the Society he was appointed Secretary of the International Committee on Horticultural Nomenclature and Registration. The Council will sadly miss his knowledge and efficiency and wishes him every success in his new sphere of activities.

The Council is pleased to be able to announce that it has appointed Mr. F. P. Knight as Director of the Society's Gardens at Wisley in place of Dr. H. R. Fletcher. Mr. Knight is very well known in the horticultural world and in addition has been a member of the Society's Floral Committee for many years.

Signed on behalf of the Council,
(*Sgd.*) D. BOWES-LYON
President.

December 31, 1954.

THE NUMERICAL STRENGTH OF THE SOCIETY ON DECEMBER 31, 1954

Classification	Strength on Dec. 31 1953	Losses 1954		Total Losses	Elections and Admissions 1954	Adjustments	Net Increase or Decrease during 1954	Strength on Dec. 31 1954
		By Death	By Resignation					
Life Fellows	1,281	27	—	27	17	+14 (a)	+ 4	1,285
Fellows	38,911	422	2,704	3,126	4,979	—42 (b)	+1,811	40,722
Overseas Fellows	1,811	8	224	232	451	+28 (c)	+ 247	2,058
Associates	1,442	6	144	150	186	—	+ 36	1,478
Affiliated Societies	1,795	—	70	70	183	—	+ 113	1,908
Student Members	28	—	28	28	15	—	— 13	15
Honorary Fellows	32	1	—	1	—	—	— 1	31
Associates of Honour	99	5	—	5	6	—	+ 1	100
Totals	45,399	469	3,170	3,639	5,837	—	2,198	47,597

(a) Fellows transferred to Life Fellows. (b) Fellows transferred to Life Fellows or Overseas Fellows.
(c) Fellows transferred to Overseas Fellows.

Dr. ANNUAL REVENUE & EXPENDITURE ACCOUNT

1953 £	1953 £		£	£
		To LONDON—		
		ESTABLISHMENT EXPENSES LESS ALLOCATIONS—		
4,912		Rent, Rates and Taxes	5,652	
16,121		Salaries and Wages	17,063	
10,423		Other Establishment Expenses, including Light, Fuel, Stationery, Professional fees, Renewals, etc.	10,933	
	31,456			33,648
		„ WISLEY—		
	40,281	Net Expenditure for Year, as per separate Account		44,036
		„ PUBLICATIONS—		
21,861		Journal	24,869	
10,032		Other Publications	10,499	
31,893			35,368	
19,100		*Less* Sales, Advertisements and Royalties	18,700	
	12,793			16,668
	2,103	„ STAFF PENSION SCHEME		2,098
		„ MEETINGS—		
42,907		Expenses, Labour and Overheads of Special and other Meetings (*1953 included provision for Chelsea Show Works £1,000*)	53,526	
38,803		*Less* Receipts	43,388	
	4,104			10,138
	483	„ CUPS AND MEDALS		614
		„ CONTRIBUTIONS TO LINDLEY LIBRARY, as per Trust Account—		
635		Purchase of Books	248	
1,591		Salaries, etc.	1,774	
	2,226			2,022
		„ SPECIAL EXPENDITURE—		
704		Donations	756	
50		Expeditions	1,450	
	754			2,206
	670	„ BOTANICAL MAGAZINE		785
		„ EXAMINATIONS IN HORTICULTURE—		
2,803		Expenses	2,828	
2,426		*Less* Fees	2,390	
	377			438
300		„ SCHOLARSHIP	225	
		Less Contributions from—	£	
135		Worshipful Company of Gardeners	101	
30		Sir James Knott Trust	23	
			124	
	135			101
	95,382	Carried forward		112,754

FOR THE YEAR ENDED 31st DECEMBER, 1954 Cr.

1953		
£		£
108,215	By Annual Subscriptions and Donations . . .	113,226
4,570	„ Dividends and Interest	4,443
17,034	„ Hall Lettings, Gross	18,296
	„ Life Compositions—	
436	Being amounts transferred in respect of Life Fellows who have died during the year . .	621
750	„ Rent of Freehold Property (Wisley) . . .	898
	„ Restaurants—	
318	Receipts, less Expenditure (including proportion of Overheads)	809
131,323	Carried forward	138,293

Dr. ANNUAL REVENUE & EXPENDITURE ACCOUNT

1953		
£		£
95,382	Brought forward	112,754
3,366	To Old and New Halls Sinking Fund Appropriation	3,366
25,000	„ Transfer to Wisley New Building Reserve . .	11,509
6,000	„ Transfer to Provision for Maintenance of Premises, London	4,000
1,575	„ Balance, added to General Reserve . . .	6,664
£131,323		£138,293

FOR THE YEAR ENDED 31st DECEMBER, 1954—*cont.* Cr.

1953		
£		£
131,323	Brought forward	138,293
£131,323		£138,293

Dr. WISLEY GARDENS—REVENUE & EXPENDITURE

1953 £	£		£	£
		To Establishment Expenses		
7,977		Salaries and Wages	7,683	
1,095		Rates, Taxes and Insurances	1,106	
3,969		Miscellaneous	4,539	
472		Annuities	555	
	13,513			13,883
		„ Laboratory and School of Horticulture—		
3,654		Salaries and Wages	4,317	
168		Miscellaneous	205	
77		Depreciation of Equipment	95	
	3,899			4,617
		„ Garden—		
15,398		Salaries and Wages	17,079	
3,682		Hostels—Maintenance and Board	4,277	
787		Seed Distribution *less* Receipts	1,003	
2,610		Miscellaneous	2,419	
190		Depreciation of Plant and Equipment	1,229	
1,250		Allocation to Depreciation and Renewals Fund	1,250	
	23,917			27,257
		„ National Fruit Trials— (Direct expenditure)		
3,532		Wages	3,564	
1,011		Miscellaneous	673	
	4,543			4,237
	1,112	„ Staff Pension Scheme		1,277
	£46,984			£51,271
	40,281	To Balance, brought down		44,036
		„ Special Expenditure—		
		Plumbing Repairs	78	
		Sewage Plant	75	
		Car Park	510	
5,473			663	
		Less Transfer from Depreciation and Renewals Fund—		
5,473	—	Wisley	663	—
	£40,281			£44,036

ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1954 Cr.

1953 £	£		£	£
	1,325	By Dividends and Interest on Wisley Endowment and Depreciation and Renewals Funds . .		1,221
	2,958	„ Garden— Miscellaneous Receipts		3,288
1,220		„ National Fruit Trials Sales	1,526	
1,200		Grant from Ministry of Agriculture . . .	1,200	
	2,420			2,726
	40,281	„ Balance, carried down		44,036
	£46,984			£51,271

40,281	By Balance, being Net Expenditure for the Year, carried to the Annual Revenue and Expenditure Account		44,036
£40,281			£44,036

1953 £	£		£	£	£
		CAPITAL FUNDS AND RESERVES			
	250,000	ACCUMULATED FUNDS ACCOUNT . . .		250,000	
		GENERAL RESERVE ACCOUNT—			
89,328		Balance at 31st December, 1953 . . .	90,920		
		Add Transfer of Monograph Fund . .	507		
		Balance of Revenue and Expenditure			
1,575		Account, 31st December, 1954 . .	6,664		
17		Surplus on Redemption of Investments .	13		
	90,920			98,104	
	340,920				348,104
		WISLEY NEW BUILDING RESERVE			
10,000		Balance at 31st December, 1953 . . .		23,219	
		Add Transfer from Revenue and Expenditure			
25,000		Account		11,509	
35,000				34,728	
		Less Transfer to Wisley Gardens Accumulated			
11,781		Funds Account		34,728	
	23,219				—
		DEPRECIATION AND OTHER FUNDS			
		OLD AND NEW HALLS SINKING FUND—			
107,367		Balance at 31st December, 1953 . .	114,404		
3,665		*Add* Income on Investments for the year .	3,959		
		Allocation from Revenue and Expendi-			
3,366		ture Account	3,366		
6		*Surplus on Sales of Investments*	—		
	114,404			121,729	
	10,000	DEPRECIATION AND RENEWALS FUND, LONDON		10,000	
		DEPRECIATION AND RENEWALS FUND, WISLEY—			
13,409		Balance at 31st December, 1953 . .	9,562		
		Add Allocation from Revenue and Expendi-			
1,250		ture Account	1,250		
376		*Surplus on Sales of Investments*	—		
15,035			10,812		
5,473		*Less* Transfer to Special Expenditure, Wisley	663		
	9,562			10,149	
		SHOWS CONTINGENCY FUND—			
4,336		Balance at 31st December, 1953 . .	4,483		
147		*Add* Income on Investments for the year .	153		
	4,483			4,636	
	507	MONOGRAPH FUND	507		
		Less Transfer to General Reserve . .	507	—	
		SUPPLEMENTARY PENSION FUND—			
2,047		Balance at 31st December, 1953 . .	2,441		
77		*Add* Income on Investments for the year .	90		
317		*Share of Policies surrendered*	—		
	2,441			2,531	
	141,397				149,045
	505,536	Carried forward.			497,149

BALANCE SHEET, 31st DECEMBER, 1954

1953 £	1953 £		£	£	£
		FIXED ASSETS			
		LONDON—			
97,402		Old Hall, Offices, and Equipment at Cost	98,080		
167,170		New Hall, Offices, and Equipment at Cost	167,170		
	264,572			265,250	
		(*Note.*—The replacement of these Assets is provided for partly by means of the Sinking and Depreciation Funds *per contra* and also by charging the cost of replacement of Equipment direct to Revenue.)			
		WISLEY—			
45,460		Freehold Land and Buildings, at Cost	46,761		
14,320		*Less* Amounts written off	14,320		
	31,140			32,441	
		Plant and Equipment—			
1,612		As at 31st December, 1953	2,505		
1,160		Purchased during year	8,237		
2,772			10,742		
267		Depreciation for the year	1,323		
	2,505			9,419	
	298,217				307,110
		FUNDS INVESTMENTS, at Cost			
114,404		Old and New Halls Sinking Fund (Market Value 31st December, 1954 £123,236)		121,729	
10,000		Depreciation and Renewals Fund—London (Market Value 31st December, 1954 £10,057)		10,000	
9,562		Depreciation and Renewals Fund—Wisley (Market Value 31st December, 1954 £10,576)		10,149	
4,483		Shows Contingency Fund (Market Value 31st December, 1954 £4,956)		4,636	
507		*Monograph Fund*		—	
2,441		Supplementary Pension Fund (Market Value 31st December, 1954 £2,514)		2,531	
	141,397				149,045
	115,875	**GENERAL INVESTMENTS, at Cost** (Market Value 31st December, 1954 £100,718)			101,862
	3,337	**PUBLICATIONS IN COURSE OF PRODUCTION**			3,339
		CURRENT ASSETS			
100		Botanical Magazine Stock (Nominal Value)		100	
13,705		Sundry Debtors and Payments in Advance		14,570	
205		Cash in Hand		245	
	14,010				14,915
	572,836	Carried forward			576,271

£	1953 £		£	£	£
	505,536	Brought forward			497,149
		LIFE COMPOSITIONS			
31,750		As at 31st December, 1953		32,420	
436		*Less* Amount transferred to Revenue in respect of Life Fellows who have died during the year		621	
31,314				31,799	
1,106		*Add* Compositions received during the year		874	
	32,420				32,673
		PROVISIONS			
		LONDON, MAINTENANCE OF PREMISES—			
2,848		Balance at 31st December, 1953	8,490		
358		*Less* Expended during the year	2,303		
2,490			6,187		
6,000		*Add* Transfer from Revenue and Expenditure Account	4,000		
	8,490			10,187	
		CHELSEA SHOW WORKS.—			
2,000		Balance at 31st December, 1953	3,000		
1,000		*Add Transfer from Revenue and Expenditure Account*	—		
		Less Expended during year	704		
	3,000			2,296	
	11,490				12,483
		CURRENT LIABILITIES			
3,135		SUBSCRIPTIONS IN ADVANCE		2,649	
		MEMORIAL AND OTHER TRUST FUNDS—			
526		Balances of Income Accounts in the hands of the Society as per Separate Schedule		532	
17,878		SUNDRY CREDITORS		25,685	
1,851		BANK OVERDRAFT		5,100	
	23,390				33,966
	£572,836				£576,271

I have audited the above Balance Sheet, dated 31st December, 1954, and have obtained all the drawn up so as to exhibit a true and fair view of the state of the Society's affairs according to the Society.

BALANCE SHEET, 31st DECEMBER, 1954—*cout.*

1953		
£		£
572,836	Brought forward	576,271
£572,836		£576,271

information and explanations I have required. In my opinion such Balance Sheet is properly best of my information and the explanations given to me and as shown by the books of the

F. G. FEATHER, F.C.A., *Auditor*,
(HARPER, FEATHER & PATERSON, *Chartered Accountants*),
1–4 Copthall Chambers,
Angel Court,
London, E.C. 2.

6th January, 1955

1953				
£	£		£	£
33,372		**ACCUMULATED FUNDS ACCOUNT**	45,153	
		Add Transfer from R.H.S. Wisley New Building		
11,781		Reserve	34,728	
	45,153			79,881
		ENDOWMENT TRUST FUND		
24,415		Balance at 31st December, 1953	24,706	
291		*Add* Surplus on Repayment of Capital . . .	187	
	24,706			24,893
	£69,859			£104,774

I have audited the books from which the above Balance Sheet is compiled and certify that it the Endowment Trust Fund is not available for use by the Society.

SHEET, 31st DECEMBER, 1954

1953 £	£		£	£
33,372		LABORATORY, DWELLING HOUSES, GLASS HOUSES, RANGES, ETC., at Cost	33,372	
11,781		HOSTEL AND RESTAURANT at Cost	46,509	
	45,153			79,881
		N.B.—The Hanbury Trust Estate is, under the Trust Deed, vested in the Society only so long as it is in a position to use it as an Experimental Garden. Accordingly the Expenditure theron by the Society is an Asset only so long as the Gardens continue to be used by the Society.		
	24,706	ENDOWMENT TRUST FUND INVESTMENTS, at Cost		24,893
		(Market value at 31st December, 1954 £25,658)		
	£69,859			£104,774

exhibits a true and fair statement of the position on the 31st December, 1954. The Capital of

F. G. FEATHER, F.C.A., *Auditor*,
(HARPER, FEATHER & PATERSON, *Chartered Accountants*),
1–4, Copthall Chambers,
Angel Court,
London, E.C. 2.

6th January, 1955.

ROYAL HORTICULTURAL SOCIETY—TRUST ACCOUNTS, 31st DECEMBER, 1954

		Fund represented by Investments at Cost.	Income Balance 31st Dec. 1953	Income received during 1954	Expended in 1954	Income Balance 31st Dec. 1954
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	Alfred Davis Trust Fund	1,629 10 10	*Nil*	53 2 4	53 2 4	*Nil*
2	Williams Memorial Fund	216 7 5	33 8 3	8 8 4	8 0 0	33 16 7
3	Masters Memorial Fund	709 9 0	6 18 5	21 8 3	28 6 8	*Nil*
4	Nicholson Memorial Fund	252 18 11	*Nil*	7 17 5	7 17 5	*Nil*
5	Schröder Pension Fund	557 14 6	1 13 8	19 4 6	20 0 0	18 2
6	Lindley Library Trust Fund	20,611 18 6 (*a*)	*Nil*	1,804 19 11 (*b*)	1,804 19 11	*Nil*
7	Sir James Knott Trust Fund	875 1 9	71 18 0	32 16 4	22 10 0	82 4 4
8	Veitch Memorial Trust Fund	1,738 11 1	195 17 8	54 4 1	46 5 0	203 16 9
9	Moore Medal Trust Fund	190 10 6	19 14 1	7 16 6	8 0 0	19 10 7
10	Sewell Medal Trust Fund	536 10 3	101 0 5	16 8 8	16 9 3	100 19 10
11	Mrs. Sherman Hoyt Prize Fund	208 1 2	48 15 11	6 4 10	7 8 0	47 12 9
12	Lord Riddell Trophy Fund	220 13 3	3 0 4	7 15 8	8 1 6	2 14 6
13	The Colman Fund	1,313 3 1	*Nil*	45 0 3	45 0 3 (*c*)	*Nil*
14	P. D. Williams Fund	372 7 9	*Nil*	63 3 3 (*d*)	63 3 3	*Nil*
15	The Glazebrook Fund	100 0 0	*Nil*	3 6 3	3 6 3	*Nil*
16	A. J. Waley Medal Fund	131 3 10	20 11 10	3 12 8	4 3 3	20 1 3
17	Holford Medal Fund	300 0 0	12 7 1	9 0 0	9 10 0	11 17 1
18	Henry George Sewell Prize Fund	173 11 7	*Nil*	60 0 0 (*e*)	60 0 0	*Nil*
19	McBean Memorial Trophy Fund	91 18 3	*Nil*	27 17 6 (*f*)	27 17 6	*Nil*
20	Chittenden Memorial Fund	276 1 2	10 11 9	14 13 4 (*g*)	16 15 0	8 10 1
	Total as per Balance Sheet	£532 1 11				

		£ s. d.
(*a*)	Investment	1,509 1 2
	Cost of books purchased by Society to 31st Dec. 1953	18,855 6 6
	Books purchased by Society in 1954	247 10 10
		£20,611 18 6

(*b*) Includes contribution by the Society £1,774 1 7

(*c*) Income re-invested.

(*d*) Includes contribution by Society £52 3 10

(*e*) Includes £54 6 0 from Capital.

(*f*) Includes £24 14 2 from Capital.

(*g*) Includes £5 from Worshipful Company of Gardeners.

Notes on above Funds:

1. Bequeathed to the Society in 1870 for annual prizes or any other object the Council may determine. 2. Raised by donations in 1891 in memory of the late Mr. B. S. Williams towards the provision of prizes and medals. 3. Raised by donations in 1908 in memory of the late Dr. Masters towards the provision of one or more annual lectures. 4. Raised by donations in 1908 in memory of the late Mr. George Nicholson to provide prizes for Wisley students. 5. Provided by the Society in memory of the late Baron Schröder to pay to the Gardeners' Royal Benevolent Institution for one pension. 6. The nucleus of the library is the fine collection of books and pamphlets which belonged to the late Dr. Lindley. It has since been added to by the books purchased by the Society and by the gifts of the late Mr. Reginald Cory and others. 7. Presented to the Society in 1920 by the late Sir James Knott for the purpose of providing a scholarship. 8. Instituted in 1870 in commemoration of the late Mr. James Veitch for the encouragement of Horticulture. Fund vested in the Society in 1922. 9. Presented to the Society in 1926 by the late Mr. G. F. Moore to provide a medal annually for the Cypripedium which shows the greatest improvement on those of the same or similar parentage shown to the Society during the year. 10. Presented to the Society in 1928 by the late Mr. A. J. Sewell to provide medals for Rock Garden Plants. 11. Presented by Mrs. A. Sherman Hoyt in 1920 as a donation and funded by the Society to provide prizes for the encouragement of the growth of Cacti and Succulents. 12. Presented by the late Lord Riddell in 1931 to provide a trophy annually to be awarded for vegetables. 13. Presented to the Society in 1935 by Sir Jeremiah Colman, Bt., V.M.H., to be used for the improvement of flowers or fruit. 14. Raised in 1936 by donations to provide medals to commemorate the late Mr. P. D. Williams and to encourage the cultivation and improvement of Daffodils and Rhododendrons. 15. Bequeathed to the Society in 1938 by the late Mr. H. de T. Glazebrook to provide prizes at the Society's shows. 16. Instituted by Mr. Alfred J. Waley in 1937 to provide an annual award to any working gardener who has helped the cultivation of Rhododendrons. Fund vested in the Society in 1946. 17. Presented in 1947 by the Trustees of the late Sir George Holford to perpetuate the Holford Medal, offered since 1928 for the best exhibit of plants and/or flowers (excluding fruit or vegetables) shown by an amateur during the year. 18. Presented in 1947 by Mrs. A. M. Sewell in memory of her husband, Dr. H. G. Sewell, to provide 10 annual prizes to be awarded for a competition at one of the Society's Shows. 19. Presented in 1947 by the family and friends of the late Mr. A. A. McBean, to provide a Silver Trophy annually from 1949, over as long a period as the sum shall last, for the best exhibit of Cymbidiums shown by an amateur. 20. Capital contributed by The Royal Horticultural Society, the Horticultural Education Association and the Wisley Gardens Club in 1952 to provide an income for the award of "The Chittenden Memorial Prize" to the top candidate in Section 1 (General Horticulture) in the final of the N.D.H. examination and a "Chittenden Award" to the top candidate in the N.D.H. preliminary examination and the top candidate in the Wisley Diploma examination.

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXX PART TWO

February 1955

THE SECRETARY'S PAGE

ANNOUNCEMENTS—FEBRUARY AND MARCH

Shows

TUESDAY, February 8 12 NOON to 6 P.M. WEDNESDAY, February 9 10 A.M. to 5 P.M.	Fortnightly Flower Show.
TUESDAY, February 22 12 NOON to 6 P.M. WEDNESDAY, February 23 10 A.M. to 5. P.M.	Fortnightly Flower Show. Annual General Meeting at 3 P.M. on February 22. (*See page* 72.)
TUESDAY, March 8 12 NOON to 6 P.M. WEDNESDAY, March 9 10 A.M. to 5 P.M.	Fortnightly Flower Show.
TUESDAY, March 22 12 NOON to 6 P.M. WEDNESDAY, March 23 10 A.M. to 5 P.M.	Fortnightly Flower Show. British Orchid Growers' Association's Show.

Lectures

TUESDAY, February 8, at 3 P.M. "Our Experience in the Cultivation of Cacti and Succulent Plants" by LT.-GEN. SIR OLIVER LEESE, BT., K.C.B., C.B.E., D.S.O., and LADY LEESE.

TUESDAY, March 8, at 3 P.M. "Electric Heating in Horticulture" by MR. E. W. GOLDING, M.SC.TECH., M.I.E.E., M.A.I.E.E.

TUESDAY, March 22, at 3 P.M. "Orchid Hybrids and their Origin" by MR. D. F. SANDER.

Annual General Meeting—The Annual General Meeting to receive the Report of the Council for 1954 and a statement of accounts for that year will be held on Tuesday, February 22, at 3 P.M. The Meeting will be held in the Old Hall instead of in the Lecture Room as in previous years and there should be ample room for all who wish to attend.

Demonstrations at Wisley—The following demonstrations will be given at Wisley, that on the second day being in each case a repetition of that given on the first.

Flower Garden

March 2–3. The Pruning of Roses. (Commencing at 2 P.M.)
March 9–10. Seed Sowing and Vegetative Propagation of Alpines. (Commencing at 2 P.M.)

Fruit Garden

March 16–17. Pests and Diseases of Fruit Trees ; Recognition and Methods of Control. (Commencing at 2 P.M.)

Results of the Society's Examination held in 1954—Examination for the National Diploma in Horticulture. Six candidates sat for the N.D.H. Final Examination in Section III, Fruit Crop Husbandry, and the Diploma has been awarded to the following :—

MR. D. W. BURD
MR. P. H. HARRISON
MR. K. J. HYRYCZ.

Gardens Adviser—The National Trust has asked us to announce that it needs a part-time Gardens Adviser to supervise certain selected gardens, including Hidcote, Stourhead, Killerton, Blickling, Cotehele and Polesden Lacey.

Applicants for this post should send full particulars, giving their age and experience, and the names of at least two referees to :—

The Secretary, The National Trust,
42, Queen Anne's Gate, London, S.W. 1.

Journal and Botanical Magazine Binding—Arrangements have now been made for those Fellows who so wish to have the JOURNAL bound in green cloth with the lettering and crest in gold. The cost for each volume of 12 parts will be 9*s*. 6*d*. plus 1*s*. 6*d*. for return postage and packing. Fellows may also have the *Botanical Magazine* bound in dark blue buckram with gold lettering. The cost for each volume will be 13*s*. 6*d*. plus 1*s*. 6*d*. for return postage and packing. Parts for binding should be sent with remittance to Messrs. Mansell (Bookbinders) Ltd., 41 Britannia Row, Essex Row, London, N.1. The parts should *not* be sent to the Offices of the Society. Inquiries for binding in special styles should also be addressed direct to Messrs. Mansell.

The Selection and Culture of House Plants—This article by MR. C. R. BOUTARD in the June 1954 issue of the JOURNAL has been republished as a 13-page pamphlet with 4 pages of illustrations. Price 1*s*.0*d*. Postage and packing, 3*d*.

NOTES FROM WISLEY

J. B. Paton

In many centuries herbs have been cultivated for their medicinal and culinary virtues. Gradually with the advance of science and the increased use of synthetic drugs their use in medicine has been superseded. In this note therefore consideration will be given to a few of those herbs which still are in considerable demand in the kitchen. The plants mentioned may be seen at Wisley, either on the Vegetable Trial Grounds or in the two short borders which flank the path which leads from the top of the Rock Garden on to Weather Hill .

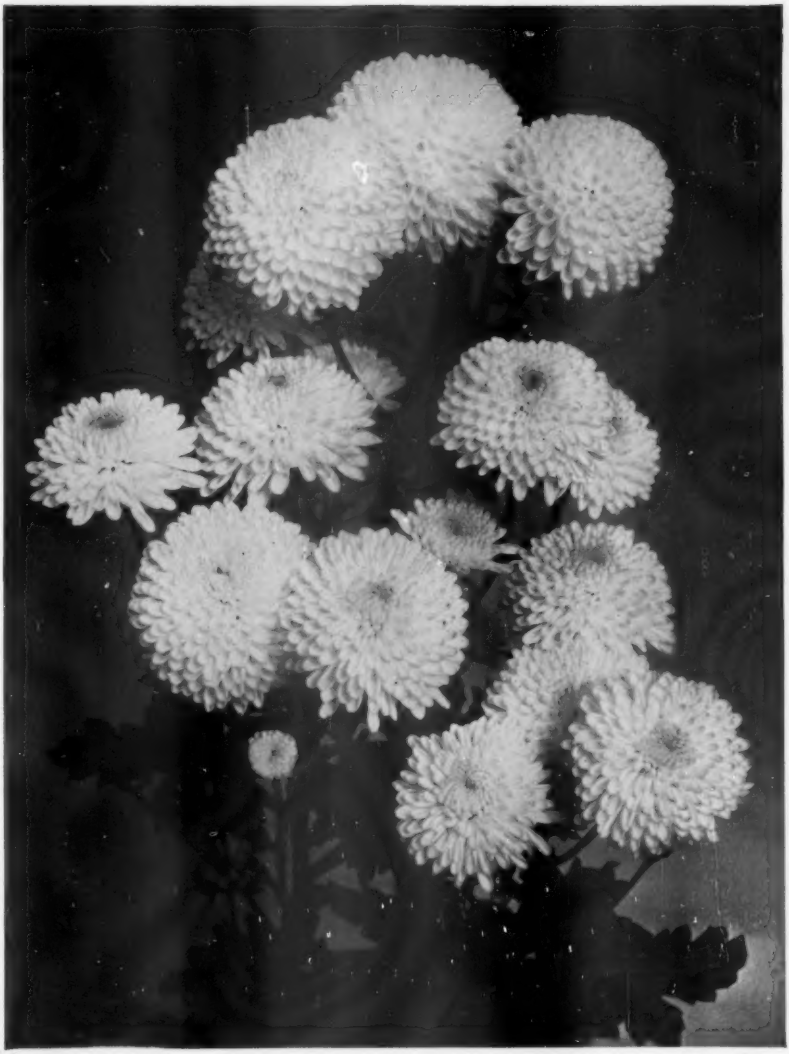
Of the many species of the perennial onion one of the most commonly grown is that known as *Allium schoenoprasum*, chives, whose tiny bulbils, surviving the winter just under the surface of the soil, produce rush-like leaves. These may be used, chopped, in salads. To ensure a continuous supply it is best to cut the plants to the ground before they produce their mauvy-purple attractive flowers in dense hemispherical umbels. There is a stronger growing variety, *sibiricum*, which may be 15 inches high, and there is also the Chinese chives *A. tuberosum*. *A. sativum*, garlic, is of very ancient origin having been cultivated in Mediterranean countries since remote antiquity, and being recorded in Numbers xi. 5, as the food of the Israelites when in Egypt. It has been grown in England since the sixteenth century. The so-called bulb is a compound structure, consisting of numerous bulblets, known technically as cloves, grouped together between the membranous scales and enclosed within a whitish skin which holds them as in a sac. The cloves should be planted on well prepared land at the end of February and the resulting bulb should be dried in the same way as are shallots. *A. scordoprasum*, the rocambole or sand leek, has cloves similar to those of garlic and in addition bears a cluster of bulblets at the top of the stem. Also bearing bulblets at the apex of the scape is *A. cepa* var. *aggregatum*, the tree or Egyptian onion. The bulblets are the size of hazelnuts and keep well throughout the winter; when planted in the spring they form larger bulbs but usually do not throw up a stem strong enough to produce bulblets in the first season. *A. fistulosum*, the ciboule or Welsh onion, is an evergreen and can be used for flavouring throughout the winter in manner similar to that in which spring onions are used in April and May.

Of the family Compositae there is *Artemisia dracunculus*, tarragon, which grows best in a warm sunny position and may need protection in severe winters. The plant has numerous branching stems which may be up to 3 feet high, and its leaves, which should be gathered before the flowers appear, are used in making tarragon vinegar. The process is to dry slightly the leaves, place them in a jar, cover with white vinegar, and allow them to stand for 14 days. The resulting liquor, which should be

strained and stored in air-tight jars, may be used in salads and is the correct vinegar for Sauce Tartare. *A. absinthium*, wormwood, was mainly used medicinally as was *A. abrotanum*, southernwood, old man, or lad's love. This latter plant is worth a place in any collection of herbs on account of its ornamental, finely-divided, greyish-green leaves. One of the older herbs in cultivation is *Chrysanthemum balsamita*, costmary or alecost, this last name referring to its use in the making of ale. The leaves also may be added to salads but its peculiar taste does not suit all palates, and perhaps a better use is to tie sprigs of the plant with lavender and place them between linen. Its near relative *Tanacetum vulgare*, tansy, also has a strong flavour, not now much favoured, but its attractive curled foliage make a pleasant garnish to a dish of cold meat. Its heads of flat, round, rayless, golden-yellow flowers are also notable in August and September.

In the family Labiatae there are many herbs which are popular with the cooks and none more so than mint. At Wisley a considerable number of mints has been gathered together and it is interesting to compare the differences between individual market growers' selections of *Mentha spicata*, the common green mint or spearmint. Although morphologically they are all the same some respond better to forcing than others, and some are better for drying than others. There are also stocks which show morphological variation from the true *M. spicata*, but are not sufficiently distinct to warrant their being given specific rank; these include one with red stems, one with very hairy leaves and stems, and two with much darker foliage; one of these latter produces very little flower. In the collection there are also *M. spicata* var. *angustifolia* with longer, more pointed leaves and *M. spicata* var. *lacerata* with cut leaves. *M. spicata* is particularly susceptible to the rust fungus *Puccinia menthae*, which until this year has been successfully controlled by lifting the roots in the autumn, washing them, laying them in for the winter, and replanting young shoots in new ground in the following spring. However, this year rust has appeared on some stocks in the collection, and so it is proposed this spring to give the plants the warm water treatment for 10 minutes at 110° F. Other species represented on the Vegetable Trial Grounds include *Mentha citrata*, the bergamot mint, with glabrous broadly rounded to heart-shaped leaves which yield a fragrant lemon-scented oil, *M. rotundifolia* with roundish to ovate leaves and *M. longifolia* with narrow lanceolate leaves. Of hybrid mints there is *M.* × *alopecuroides* which is one of the many forms resulting from the crossing of *M. longifolia* and *M. rotundifolia*, and which is a vigorous growing mint popular for the market. Likewise vigorous is *M.* × *cordifolia*, which is bred from *M. rotundifolia* and *M. spicata*. As it has the habit of throwing up many young shoots during the season it is of great value to those requiring supplies over a long period. A form that is not so vigorous is *M.* × *cordifolia* var. *brevifolia*.

Salvia officinalis, sage, is represented at Wisley by three or four



Photo, J. E. Downward

FIG. 12—Chrysanthemum 'Paramount.' **F.C.C.** November 30, 1954. Exhibited by the Colham Green Nurseries

VICTORIA MEDAL OF HONOUR, 1954

FIG. 13—THE HON. LEWIS PALMER, F.L.S., Treasurer of the Society

VICTORIA MEDAL OF HONOUR, 1954

FIG. 14—PROFESSOR R. H. STOUGHTON, D.SC.

Photo, J. E. Downward

THE REGINALD CORY MEMORIAL CUP, 1954

FIG. 15—Rhododendron 'Lascaux,' raised at Wisley from a cross between R. 'Fabia' and *R. litiense*. **A.M.** June 15, 1954. Exhibited by The Director, R.H.S. Gardens, Wisley

Photo, W. Abbing

THE GEORGE MOORE MEDAL, 1954

FIG. 16—Cypripedium (Gorse G.) 'Chilton,' shown by Messrs. R. & E. Ratcliffe of Didcot on February 16, 1954

Photo, J. E. Downward

THE WILLIAMS MEMORIAL MEDAL, 1954

FIG. 17—Exhibit of polyanthuses and primroses shown by Messrs. Blackmore & Langdon of Bath on April 27, 1954

Photo, J. E. Downward

THE LAWRENCE MEDAL, 1954

FIG. 18—Exhibit of gladioli, shown by Messrs. Konynenburg & Mark of Noordwyck, Holland on August 10, 1954

Photo, J. E. Downward

THE GEORGE MONRO MEMORIAL CUP, 1954

FIG. 19—Exhibit of vegetables shown by COL. E. J S. WARD, M.V.O., M.C., of Hungerford on October 19, 1954

stocks which differ from the type plant with its white woolly stems and greyish-green leaves. It is an evergreen undershrub from Southern Europe which has been in cultivation in this country for many years. GERARD in 1597 mentions it in his Herbal as being a well-known plant of English gardens and states that he has several varieties in his garden at Holborn. There are at Wisley the white-flowered variety *albiflora*, which is reputed to be the best sage for culinary use, and the purple-leaved one *purpurascens* which may be used in formal bedding.

The leaves of *Melissa officinalis*, balm, are useful for flavouring stews, soups, and salads, and being of mild flavour may be used in larger quantities than most herbs. The lemon balm was much in favour when lemons were in short supply, for the leaves of this balm are similar in flavour to the lemon fruits.

Both rosemary, *Rosmarinus officinalis*, and lavender, *Lavandula spica*, are members of the plant family Labiatae, and both are useful additions to the herb garden, for being hardy evergreen shrubs their grey-green foliage is always a present delight. Rosemary leaves may be added to roasting lamb ; lavender, of course, is of no culinary value, but is universally used in bags, to perfume linen and other clothes stored away in cupboards. At Wisley there can also be seen the attractive white-flowered Lavender *L. stoechas* var. *albiflora* which is not always truly hardy.

Thymus serpyllum, the native thyme of the English countryside, is a low-growing, mat-forming plant, whereas *T. vulgaris*, the garden thyme, a native of Southern Europe, makes a small spreading woody bush some 6–8 inches high which supplies a ½-inch long leaf so valued by the cook. *T.* × *citriodorus*, the lemon thyme, is a hybrid between *T. vulgaris* and *T. pulegioides*, this latter species being of wide distribution over Europe including Britain. Other Labiates used for flavouring include marjoram—*Origanum majorana*, a desirable ingredient for stuffings; winter savory—*Satureia montana*, a semi-evergreen shrub that was as much used by Romans for making sauce with vinegar as is mint today, and the hyssop—*Hyssopus officinalis* once used for flavouring broths, but now considered too strong and so now it is mainly grown on account of its pretty blue flowers. The hyssop of the Bible is the caper plant, *Capparis spinosa*.

Parsley, *Petroselinum crispum*, a member of the Umbelliferae, is a hardy biennial, and thus to ensure a continuous supply seed should be sown each year either in April or in September. It is one of the ingredients of "Fines Herbes," the others being chervil (*Anthriscus cerefolium*), chives and tarragon. Fennel, *Foeniculum vulgare*, is incorporated in sauces prepared to cover fish. Another Umbelliferous plant, angelica (*Angelica archangelica*) has two uses; the stems are preserved in sugar and the roots used in the preparation of gin. Other herbs which may be seen in the gardens include the broad-leaved sorrel—*Rumex acetosa*; rue—*Ruta graveolens*; horse radish—*Cochlearia armoracia*; and liquorice—*Glycyrrhiza glabra*.

PLANTS OF INTEREST AT WISLEY DURING FEBRUARY

GLASSHOUSES

Begonia manicata
Calanthe varieties
Cochlioda densiflora
Coelogyne flaccida
Cymbidium varieties
Lycaste cruenta
„ *skinneri*
Oncidium bicallosum
Streptosolen jamesonii

FRAMEYARD WALL

Abeliophyllum distichum
Clematis calycina

SEVEN ACRES

Forsythia giraldiana
Prunus conradinae var. *semi-plena*
Salix acutifolia
„ *daphnoides*
„ *gracilistyla*

AWARD OF GARDEN MERIT COLLECTION

Cornus mas
Forsythia ovata
Lathraea clandestina
Prunus davidiana
Scilla bifolia
Viburnum fragrans

WILD GARDEN

Corylopsis pauciflora
Galanthus species
Narcissus cyclamineus
Pieris japonica
Primula denticulata

WILD GARDEN—(*contd.*)

Primula edgeworthii
„ *gracilipes*
Sarcococca hookeriana var. *digyna*
Stachyurus praecox

ROCK-GARDEN AND ALPINE HOUSE

Adonis wolgensis
Crocus chrysanthus varieties
Eranthis × *tubergeniana*
Galanthus byzantinus
„ *elwesii*
Helleborus corsicus
Hepatica transsilvanica
Iris histrioides
„ *reticulata* and varieties
Leucojum vernum
Narcissus species and varieties
Primula allionii
„ *floribunda*
„ *scapigera*
Puschkinia scilloides
Sarcococca humilis
Saxifraga burseriana and varieties
„ *grisebachii*

BATTLESTON HILL

Camellia sasanqua and varieties
Mahonia napaulensis
Rhododendron 'Bo-Peep'
„ 'Bric-à-Brac'
„ 'Christmas Cheer'
„ *leucaspis*
„ *lutescens*
„ 'Seta'
„ 'Tessa'

The above is a selection of the plants which may be expected to be in flower during February, provided that the weather is not too inclement.

MASTERS MEMORIAL LECTURE, 1954

THE HISTORY OF GARDEN ROSES

Ann P. Wylie

(*Department of Botany, The University, Manchester*)

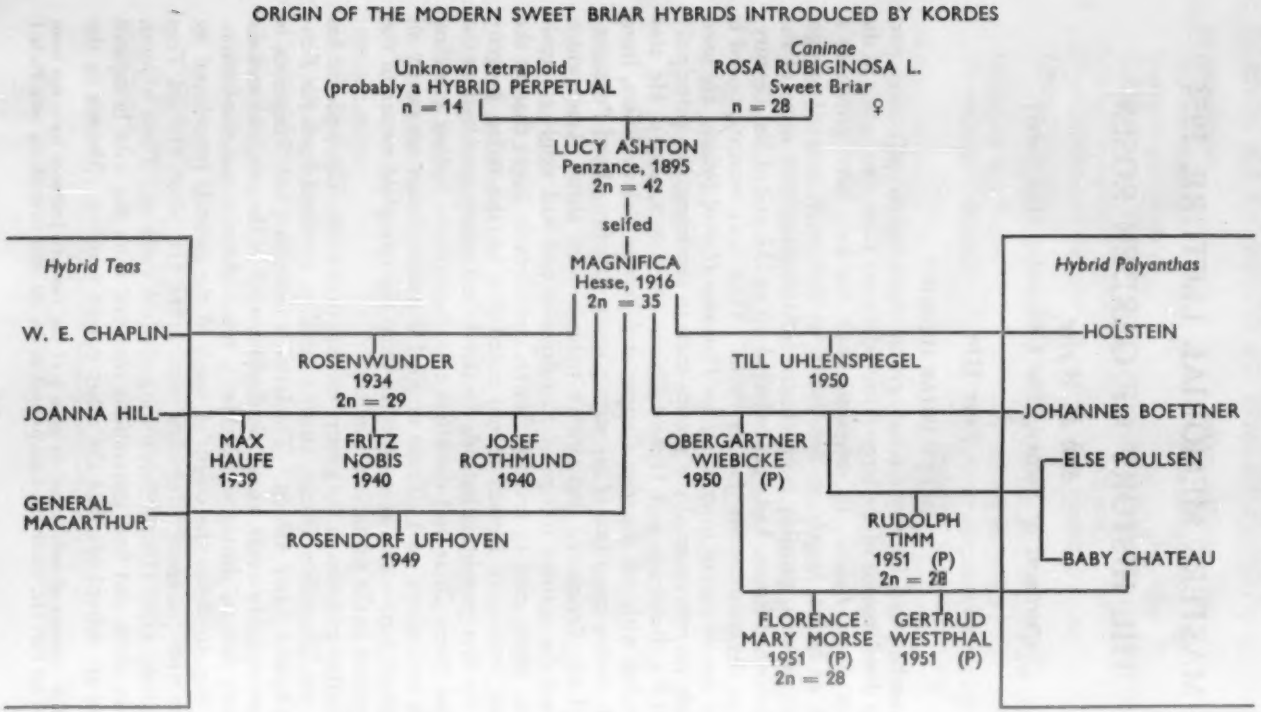
PART III*

SWEET BRIAR HYBRIDS

Another, initially very distinct, group which has recently taken part in the development of the large-flowered cluster Rose class is that of the *Hybrid Sweet Briars*. *R. rubiginosa* itself has long been grown as a shrub or hedge, largely on account of its deliciously scented foliage. A few variants, possibly from chance hybridization with some of the old-fashioned Roses, had been selected up to the end of last century, such as the semi-double 'Janet's Pride.' Then LORD PENZANCE used it as the female parent in creating his *Penzance Hybrid Briars*. He used as male parents most of the groups then in existence, but principally the H.P.s, Bourbons and Hybrid Chinas (PENZANCE, 1892). He also succeeded with the Austrian Copper and Persian Yellow Roses, from which crosses came two of his most popular varieties, 'Lord Penzance' and 'Lady Penzance.' PENZANCE's hybrids were shrub Roses which retained the scented foliage of *R. rubiginosa* and had single to semi-double, white, pink or crimson flowers considerably larger than in the species. PENZANCE himself (1896) noted that in the selfed progeny from the first generation hybrids the flower had nearly gone back to the original Sweet Briar and doubtless this discouraged further breeding on his and others' part. These original Penzance Briars are nearly all hexaploids ($2n = 42$), as is expected from the tetraploid nature of the embryo sac in the pentaploid *Caninae*.

Further progress in the group was due to KORDES. The basis for his work was 'Magnifica' (HESSE, 1916) a seedling obtained from the Penzance hybrid 'Lucy Ashton.' The latter is hexaploid, but 'Magnifica' is only pentaploid (WYLIE, 1954), no doubt a result of the irregular meiosis in 'Lucy Ashton' during which there is much chromosome elimination. Text Fig. 16 shows the origin of some of the hybrids introduced by KORDES from crosses of 'Magnifica' with, in the first place, Hybrid Teas and subsequently Hybrid Polyantha and Musk varieties. These modern hybrids, three and four generations removed from the wild hexaploid species are tetraploids, like the other parent varieties. Meiosis in the

* The changes of style noted on page 3 of the January JOURNAL have not been adopted for Part III, which has been printed in the old style to conform with Parts I and II.



TEXT FIG. 16—Origin of the modern Sweet Briar hybrids bred by KORDES. (P) denotes recurrent flowering

pentaploid 'Magnifica' is irregular, as in the original Penzance hybrids, and leads to considerable chromosome loss during germ-cell formation.

Most of the seedlings obtained from crossing 'Magnifica' with the garden Roses were once-flowering, vigorous shrub Roses (KORDES, 1951B), but one dwarf perpetual-flowering plant appeared in the cross of 'Magnifica' and the Hybrid Polyantha 'Johannes Boettner' (Fig. 16). It had the additional desirable quality of being highly resistant to black spot. This variety ('Öbergartner Wiebicke') has since been widely used by KORDES in further crosses with Hybrid Polyanthas, from which he has obtained a series of vigorous bush varieties, with a good succession of blooms in several different colours. All are said to be exceptionally hardy and disease resistant. The scented foliage of the wild *R. rubiginosa* has unfortunately almost disappeared from these later hybrids, but perhaps was only to have been expected from the chromosome loss involved in descending from the hexaploid to the tetraploid level. However, this group of varieties should prove valuable in future Floribunda breeding. KORDES has also used them in crosses with his *R. Kordesii* and notes (1950) that the hybrids themselves are still fully fertile.

RUGOSA HYBRIDS

Another small group of garden Roses contains some important shrub Roses and also illustrates an important general method of evolution not certainly demonstrated in other cultivated Roses. It contains the hybrids derived from the Far-Eastern diploid species *R. rugosa*, of the section *Cinnamomeae*. We have already encountered this species in one of the Hybrid Polyantha sections, but the species was used in other breeding work long before that. During the period 1885–1910 a number of shrub varieties were raised, especially in the U.S.A. (by CARMAN and JACKSON DAWSON) and in France (by GRAVEREAUX), from crosses with Tea Roses, H.T.s and H.P.s. These hybrids usually retained the characteristic tough, wrinkled *R. rugosa* foliage, also its weak flower stems and intense fragrance. *R. rugosa* itself is one of the most free-flowering species apart from the *Chinenses* and many of the primary hybrids with derivatives of *R. chinensis* did not lose altogether the free-flowering habit of the latter.

Most Rugosa hybrids are either diploids, from crosses with the diploid Tea Roses, e.g. 'Mme. Georges Bruant,' or triploid, from H.P. and H.T. crosses, e.g. 'Ruskin' and 'Rose à Parfum de l'Hay. The latter have proved extremely sterile, with gross abnormalities during meiosis. Many of the diploid hybrids also are notoriously sterile. Until very recently this sterility has been a barrier to further breeding from the primary Rugosa hybrids, save to a very limited extent from the old 'Conrad Ferdinand Meyer' (1899), a tetraploid resulting probably from an unreduced *R. rugosa* gamete.

However, spontaneous doubling of the chromosome number in the sterile diploid 'Max Graf' (which is probably a hybrid of *R. rugosa* and *R. Wichuraiana*) occurred in the early 1940's with KORDES (WULFF, 1951).

This variety had been repeatedly selfed for years, before it produced some hips in 1940, from which two seedlings were raised, one reaching maturity. Subsequently, two further seedlings have been raised from 'Max Graf' in 1950 and 1951 and all three have been found to be tetraploids by WULFF (1951). It has not been determined yet in what way the chromosome doubling occurred.

The new tetraploid named *R. Kordesii* by WULFF, is notably fertile and has been widely used in the last few years by KORDES in crosses with most of the major Rose groups. The striking series of hybrids of *R. Kordesii* with the Wichuraiana climber 'Golden Glow' and also Hybrid Polyanthas, which were to be seen at "Oaklands" in 1953, is an example of the developments to be expected in a few years' time. Some of these hybrids approach closely the hitherto unrealized ideal of a hardy perpetual-flowering climber. Furthermore, as KORDES (1950) points out, these Kordesii hybrids are notably disease resistant in addition to being absolutely hardy.

A renewal of interest in breeding with derivatives of *R. rugosa* may therefore be expected thanks to this fortunate chance occurrence of the tetraploid form of 'Max Graf,' which proved to be fertile. *R. rugosa* certainly has some desirable features with its combination of extreme hardiness, disease-resistant foliage and large, delightfully scented, brilliantly coloured flowers produced over a long period of time.

SPINOSISSIMA HYBRIDS

The tetraploid *R. spinosissima* of the section *Pimpinellifoliae* has had a curious history as far as the garden Roses are concerned. This familiar early-flowering native Rose with the round black hips is extremely hardy and flourishes in the poorest of soils. It varies a good deal in the wild, in flower colour and in degree of doubleness. And it was from the selection of such variants and their subsequent interbreeding from about 1790 to 1825 that Scottish nurserymen such as BROWN and AUSTIN raised the horticultural varieties of Scotch or Burnet roses. It is said that there were 300 named sorts at the peak of their popularity, though it is improbable that these were all distinct. But few of these remain today: 'Staffa' and 'William IV' are typical varieties.

It is doubtful to what extent *R. spinosissima* was crossed with other garden Roses then grown in producing the Burnet Roses, many of which seem replicas of the wild species in habit and vegetative characters, generally varying only in features concerning the flower. However, the perpetual-flowering variety 'Stanwell Perpetual' is undoubtedly a hybrid, probably with one of the Autumn Damasks.

R. spinosissima was then almost completely neglected by breeders for more than a century, until KORDES in about 1930, in his quest for winter-hardiness, began using such forms as *altaica* and *hispida* in crosses with the Hybrid Teas (KORDES, 1950). He obtained very encouraging results indeed from this line of work and has now introduced several shrub Roses, all hardy and early flowering (some flower again in

the autumn), with flowers approaching those of the H.T. class in size and form. Examples are the double yellow 'Frühlingsgold' (1937) from *R. spinosissima hispida* crossed with 'Joanna Hill,' and the single-flowered pink shading to yellow 'Frühlingsmorgen' (1940) from *R. spinosissima altaica* crossed with a red seedling from ('Cathrine Kordes' × 'E. G. Hill').

Cytologically these modern Spinosissima hybrids are more straightforward than, for instance, the Sweet Briar hybrids considered previously, since *R. spinosissima* is a tetraploid like the garden Roses with which it was crossed. The hybrids examined have likewise proved tetraploid (WYLIE, 1954), with a reasonably regular meiosis and high pollen fertility. There should be, therefore, no barrier due to cytological causes to the further use of these excellent shrub Roses in breeding work.

SOME BYWAYS IN ROSE BREEDING

A. *Old World Cinnamomeae.* The Old World subsection of the *Cinnamomeae* contains many other species besides *R. rugosa* considered above. But their contribution to the modern garden Roses has been very slight up till now. There are many desirable species in this group, a few of the more widely grown ones being *R. Moyesii* (introduced in 1894 and 1903), *R. setipoda* (1895), *R. Sweginzowii* (1910), *R. macrophylla* (1818) and *R. Davidii* (1908). It is interesting to speculate about the reasons for the near-complete neglect of such species by practically all Rose breeders. An important reason has undoubtedly been their comparatively late introduction to the Western world, many between 1900 and 1910. By this time the main lines along which the present-day Roses have developed were already firmly established, and it was only to be expected that most breeders preferred to work along lines that were known to produce results relatively quickly rather than risk spending perhaps thirty or forty years before obtaining anything worthwhile from attempting to introduce these new Oriental species into the main stream of Hybrid Tea and Hybrid Polyantha development.

R. Moyesii has attracted most attention so far. The American breeder VAN FLEET worked with it soon after its introduction, but his premature death came before much progress had been achieved. One of his hybrids reached the stage of introduction; this was 'Heart of Gold' with the origin (*R. Wichuraiana* × *R. setigera*) × *R. Moyesii* (VAN FLEET, 1919). It was a large shrub with dark crimson flowers having a white centre against which the dark anther filaments inherited from *R. Moyesii* were well displayed.

The Spanish breeder PEDRO DOT stated (1926) that he used *R. Moyesii* in his breeding work and for the variety 'Nevada' (1927) gave the pedigree 'La Giralda' (a H.T. both of whose parents are known tetraploids) × *R. Moyesii*. Since this species is hexaploid, 'Nevada' should be a pentaploid with 14 chromosomes from the H.T. parent and 21 from *R. Moyesii*. But it is only a tetraploid (WYLIE, 1954). It is therefore improbable that the typical *R. Moyesii* was the male parent of 'Nevada.'

However, this variety certainly differs from the ordinary H.T.s in its habit of growth and many vegetative characters; its male parent may, perhaps, have been one of the tetraploid *Cinnamoneae* species, of which a number are known. As yet there is no experimental evidence on this point.

KORDES has also used *R. Moyesii* and states (1950) that he has obtained perfectly hardy Roses from crosses with Hybrid Polyanthas and Musks. He has used a form called *superba* (selected by VAN ROSSEM), which is hexaploid, like the typical form (WYLIE, unpublished). Two of his alleged *R. Moyesii* hybrids have been examined cytologically: one ('Sondermeldung' × *R. Moyesii superba*) is the anticipated pentaploid and therefore a true hybrid, but the second ('Planten und Blomen' × *R. Moyesii superba*) is a tetraploid once more and therefore either a self or from an accidental cross with some other tetraploid rose. So KORDES' surprise that this particular seedling should bear hips freely, unlike his other *Moyesii* derivatives, finds a ready explanation.

Apart from these sporadic and, as the cytological evidence shows, not always successful attempts to use *R. Moyesii* in garden Rose breeding, the other species in this subsection from the Far East (with the exception already noted of *R. rugosa*) can be completely passed over in considering the history of the cultivated Roses, while the more westerly representatives, *R. cinnamomea* (diploid), *R. pendulina* and *R. laxa* (tetraploids), can be quickly dismissed.

The double-flowered mutant (*R. majalis*) of the Cinnamon Rose has been in cultivation since at least 1597, when it was described by GERARD (BUNYARD, 1936). The small group of Frankfort Roses, described by CLUSIUS, is supposed to be derived from a cross between *R. gallica* and *R. cinnamomea*, although direct evidence for this is lacking. The Frankforts have, however, not taken part in any later developments. The *Boursault* Roses form another of the minor groups developed early last century. They are almost thornless shrub or pillar Roses, commonly stated to have the origin, *R. pendulina* × *R. chinensis*. Since the former species is tetraploid, the Boursaults are expected to be triploids. However, the existing varieties (only a handful of the 50 or so at one time listed) which have been examined are diploid, hence *R. pendulina* can hardly have been one parent. Perhaps this was the diploid *R. cinnamomea* or, as HURST (1941) hints, one of the North-American species. Certainly the Boursaults were well known in America last century (PARKMAN, 1866).

R. pendulina itself has been used recently by FAGERLIND (1946) in crosses with *R. rugosa*, from which several good park Roses are said to have been obtained, while the Central Asian *R. laxa* has been used by the Canadian SKINNER in breeding hardy Roses.

B. *New World Cinnamomeae*. The New World species of the *Cinnamomeae* have played an even lesser rôle in Rose breeding than the Old World ones. The hexaploid *R. nutkana* from western North America, a vigorous, moderately hardy Rose with attractive pink flowers and large

red hips, was used by HURST in a cross with the H.T. 'Red Letter Day.' From this came the variety 'Cantab' (1927), which has the same general habit as *R. nutkana* and large carmine flowers. The pentaploid chromosome number found for 'Cantab' (WYLIE, 1954) agrees with the reported origin. Unfortunately, HURST's work on Roses came to an untimely end very soon after the production of 'Cantab' and no further developments in this line have yet been reported. The American breeder SCHOENER is also said to have used *R. nutkana* from which, crossed with a H.P., came 'Schoener's Nutkana' (1930). This in turn was employed by NICOLAS in producing such varieties as 'Polar Bear' and 'Leonard Barron.' However, cytological evidence is not yet available to substantiate this reported successful use of *R. nutkana*.

The polyploid *R. acicularis* with its extreme northerly distribution has naturally attracted attention, particularly of American breeders, but with meagre results so far. As SHEPHERD (1954) remarks, 'As *R. acicularis* does not cross freely with Roses of other sections and usually produces sterile offspring of little value, its use as a parent has been limited.' SKINNER has had some success using a hybrid of *R. acicularis* and *R. rugosa* in further breeding. Another polyploid species used in a preliminary way is the tetraploid *R. suffulta*, which has several desirable characters: hardiness, recurrent flowering and a pleasant clear pink colour without the usual tendency to go blue on ageing (WRIGHT, 1947). Several double-flowered mutants have been found in the wild, for example, the one called 'Woodrow.' WRIGHT has had encouraging results from crosses with *R. rugosa* and *R. blanda*.

The diploid *R. blanda* from the eastern side of the continent is another hardy species which has been used to a limited extent. Thornless variants were selected by HANSEN (1943) and used in breeding his thornless Roses. The species has also been employed in understock breeding by MANEY (1938) and his successors, who obtained some promising seedlings from crosses with, for instance, *R. multiflora*.

But, in general, we can say that the American species of the *Cinnamomeae* like the Old World ones, have not yet made any notable contributions to garden Rose development. The preliminary attempts made by a few people with a few species indicate that there are undoubted technical difficulties to be overcome, but it cannot be said that all the resources of modern genetical and plant-breeding techniques have been applied to the problem.

C. *Pimpinellifoliae*. The section *Pimpinellifoliae* contains, besides *R. spinosissima* and *R. foetida* considered previously, a group of early-flowering diploid species from the Far East, which includes *R. Hugonis*, *R. xanthina*, *R. primula* and *R. Ecae*, also the four-petalled *R. sericea* and *R. omeiensis*. These have yielded some pleasing shrubs when crossed among themselves or with the related *R. spinosissima*, such as 'Cantabrigiensis' and 'Earldomensis.' However, nothing of value yet appears to have been developed from crosses with garden Rose groups. VAN FLEET worked with *R. Hugonis* for many years, but the first generation

hybrids were disappointing. Thus in 1917 he writes, "*R. Hugonis* up to this time yields seedlings inferior in vigour and attractiveness to the species. The seed . . . is low in germinating power," and again in 1920, " . . . continues to be a difficult subject. The hybrids from crosses with H.T.s have flowers more curious than beautiful and are often very poor growers." He makes no mention of raising generations beyond the first and we may infer that the triploid hybrids which would result from crossing the diploid *R. Hugonis* with the tetraploid H.T.s were highly, if not completely, sterile. It is probable that artificial tetraploids of *R. Hugonis* and the other species would prove a better starting point for crosses with the tetraploid garden groups, but this has not yet been attempted.

We may conclude that the resources of the *Pimpinellifoliae* are far from being fully exploited in the development of garden Roses. The published experiences of those who have worked with the diploid species are not very encouraging, but they never got beyond the preliminary stages. The very promising results obtained by KORDES and the Canadian workers with the tetraploid *R. spinosissima* should certainly encourage its wider use in breeding programmes, particularly those in which winter-hardiness is one of the objectives.

D. *Gallicanae*. *R. macrantha*, a shrub Rose with large creamy yellow flowers, has been known in cultivation in Europe since about 1825 (REHDER, 1940). It has obvious affinities with *R. gallica* itself and is widely regarded as a hybrid between *R. gallica* and *R. canina*. However, its tetraploid chromosome number rules out any possibility that it is a direct cross of this nature. SHEPHERD'S (1954) suggestion of a cross between *R. gallica* and *R. alba* may be nearer the mark. This ancient hybrid has been used by KORDES and also KRAUSE in breeding hardy varieties, since it is a notably rugged Rose. KORDES started with a semi-double form called 'Daisy Hill' and from crosses with Wichuraiana climbers, H.T.s and the other modern tetraploids, he has produced a number of hardy Roses, such as 'Raubritter,' which has attractive shell-pink, cupped flowers. This variety is a triploid (WYLIE, 1954), so its use in further breeding is doubtful. However, from the published pedigrees, some of the hybrids should be tetraploid, such as 'Professor Ibrahim' and 'Löuis Rodiger,' and should prove more amenable.

R. gallica itself and its horticultural varieties have also been used occasionally in recent years in crosses with the modern groups; there is the example of KORDES, 'Scharlachglut' (1953), to show that more intensive efforts on these lines would prove worth while.

CONCLUSION

This brief survey of the ways in which our present-day garden Roses have developed has shown that by far the most important factor involved in their evolution has been *interspecific hybridization*, and more recently hybridization between the different groups formed from the earlier crosses. *Polyploidy* has been another factor significant in some

classes, by which initially diploid or triploid ancestors in a group have been raised to the tetraploid level of some of their ancestral species. This has undoubtedly facilitated gene exchange between the different Rose groups in this century, which has led to a breakdown of the boundaries between the once-distant classes of Hybrid Tea, Hybrid Polyantha, Hybrid Musk and Hybrid Sweetbriar, to give the vast collection of varieties comprehensively called *Floribundas* today. A third factor to be mentioned is *mutation* which in the past must have produced the double-flowered variants found in so many species, the dwarf habit in *R. chinensis* and other species, and a host more. Recently we have seen how novel flower colours in the cultivated Roses have been produced through the mutation responsible for the production of pelargonidin. And mutation was the dominant factor in producing the garden varieties in the Cabbage and Moss Rose groups, while we noted its importance in the modern Dwarf Polyantha class and to a lesser, but still significant, extent in the Hybrid Teas and Hybrid Polyanthas.

In conclusion, some of the ways will be indicated by which it seems that future progress may be attained. There is probably general agreement that the 95 per cent. of *Rosa* species so far untouched by the hybridist deserve attention. It is indeed astonishing what has been derived from the handful of species so far used, but it is unlikely that anything further really novel will be produced simply by crossing and recrossing the varieties in the present-day groups. Breeders will have to turn more and more to little or unused species in their quest for new characters.

As has been shown, the experiences of people, who in the past have attempted to use new species in developing garden varieties, have rarely given immediate encouragement and the utmost use will have to be made in the future of what is known of the cytogenetical relationships in the genus and of modern plant-breeding techniques, if workers are not to waste a great deal of time in, for example, making crosses which would result in triploid or pentaploid hybrids from which it would be difficult, if not impossible, to raise further generations. Even so, it will be a long-term breeding programme, to say the least, which really sets out to explore the possibilities of the many desirable species briefly mentioned above in the New and Old World *Cinnamomeae*, the *Pimpinellifoliae* and *Caninae*. Species in the *Synstylae* and *Gallicanae* will probably prove more amenable because of their closer relationship to the existing garden Roses, but for this reason they have less to offer that is novel than species in the former sections.

It is difficult to assess the potential value of raising the level of polyploidy in the garden Roses. In some other genera an optimum level of polyploidy has been revealed and further increase beyond this has had deleterious effects (as in *Narcissus*). However, there is no doubt that the artificial production of polyploids, whether through the use of colchicine (difficult in Roses, but not impossible) or by inducing the formation of unreduced gametes, through temperature shocks or

X-radiation at the appropriate time, will certainly have its place in particular instances. It is well known that diploid hybrids with sterility due to chromosomal causes frequently regain their fertility on being converted into tetraploids. The example of *R. Kordesii* (in which the doubling occurred spontaneously) is sufficient to encourage widespread work with other sterile hybrids, such as *R. Hardyi*, the sole known hybrid of *Rosa* (or *Hulthemia*) *persica*. Many of the untouched species are diploids and it may prove desirable to convert these into tetraploids in the first place, before starting to cross them with the existing tetraploid garden varieties. Such autotetraploids are likely to prove less fertile than the diploids, though there is reason to think that the sterility generally found in tetraploids is likely to be less marked in *Rosa* than in many other genera, if the experiences of FAGERLIND (1945) with artificial tetraploid *R. multiflora* are not just an isolated exception. For in this tetraploid, meiosis was perfectly regular with no multivalent formation which is usually responsible for sterility in autotetraploids. If the same situation is found in other doubled-up diploid species, these should be at least sufficiently fertile to make crosses with other tetraploids feasible.

Quite a different aspect which seriously needs attention concerns the root-stocks on which most Roses are grown. Practically nothing has yet been done to breed new stock varieties adapted for particular purposes and localities, to standardize the existing ones or to investigate stock-scion interactions. Work on these lines is urgently required and a beginning has been made by ROWLEY, at Bayfordbury.

One of the great needs of the practical Rose breeder is undoubtedly more basic information on Rose genetics, for, as has been shown, little is known about the genetic basis of practically all characters important in Rose breeding. A thorough investigation of the causes of sterility in Rose hybrids is also needed; the subject has never been tackled at all systematically. Future progress in the breeding of garden Roses will depend to an ever-increasing extent on the closest co-operation between the geneticists and the practical breeders.

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BEET YELLOWS VIRUS

R. Hull

THE IMPORTANCE OF GARDEN CROPS AS INFECTION SOURCES

SUGAR beet yellows is one of the most serious diseases of British agricultural crops and in some years the losses have amounted to as much as a million tons of roots, valued at about five million pounds sterling. Such severe attacks are fortunately rare, but the disease takes a considerable toll each year and over the last eight years losses have averaged 325,000 tons of sugar beet per annum. The virus causing sugar beet yellows can infect other crops, for instance mangolds, fodder beet, garden beet, seakale beet and spinach. The effects on yield of mangold and other crops have not been accurately assessed, but they are probably similar to those in sugar beet.

The sugar and farming industries have supported much research work on this disease and various precautionary measures have been introduced to reduce its incidence. The virus survives from one year to another only in infected living plants, and the overwintering seed crops of sugar beet and mangold used to provide important sources of infected plants from which the virus spread to young root crops in spring. Control measures have now been prescribed for sugar beet steckling beds and these, in conjunction with a certification scheme allowing only the beds that contain less than one per cent. of infected plants to be used, have insured almost virus-free seed crops. Similar precautions are gradually being adopted for raising mangold and red beet stecklings. Also, farmers are continuously being urged to make clamped mangolds and fodder beet less dangerous sources of infection. Not only does the virus survive in infected roots, but the green peach-potato aphid, which is the main vector of the yellows virus, can also overwinter in clamps. A most dangerous position arises when the aphids breed in spring and produce large infestations on the etiolated sprouts of virus-infected roots of mangolds or fodder beet.

Beet yellows often occurs earlier near urban areas than in open country. This happens partly because sheltered gardens, allotments and greenhouses and peach trees provide many overwintering sites for the aphid vector, *Myzus persicae*, and partly because several garden plants are also susceptible to the virus, and so can provide a spring source of both virus and aphids. One most commonly infected is seakale beet which usually becomes infected in the autumn. It provides greenstuff during the winter and in May when other vegetables are scarce. The plants remain colonized with aphids throughout mild winters and enormous populations of aphids develop in the spring, particularly when the plants run to seed. Many winged aphids are produced, which carry the virus to young root crops; the effect is most noticeable locally but may extend over several miles. From sugar beet plants infected by these aphids, the disease gradually spreads throughout the crop.

There are two measures the horticulturist can take to prevent this

happening; the first is to kill aphids by spraying the plants with an insecticide such as derris; the second is to destroy all plants as soon as they are no longer useful. Gardens often contain red beet, winter spinach and New Zealand spinach which has ceased to be useful, and would be much better cleaned up during the autumn and winter, and certainly before the beginning of April, when the new season's crops are being sown.

There is probably no more prolific source of green peach-potato aphids than a brassica crop running to seed. When aphids leave these plants they will not be carrying the yellows virus because brassicae are not susceptible to sugar beet yellows, but some aphids will soon pick it up from other plants on which they feed. Ensuring that all crops of winter greens are cleared up, and the ground dug immediately they are finished, is a measure in the gardeners' own interest, for this aphid is the most important vector of many virus diseases of garden crops—for instance of lettuce, brassica and potato.

The main attempt so far to control yellows has been to clear up as many as possible of the spring sources of infection. This is a basic policy of hygiene and should be followed as a help to controlling most virus diseases of horticultural as well as agricultural crops. Other control measures are not fully effective and are likely to give results only when there are not too many initial sources of virus in the spring. Other measures for controlling yellows, such as spraying beet crops with insecticides, are being actively investigated and give some promise of developing into a practical commercial proposition. Experimental work, however, shows that spraying is most successful when the disease is not too prevalent early in the season, and consequently strict hygiene measures to destroy overwintering sources of virus and aphid will remain a basic principle of good farming and good gardening.

It is hoped that all gardeners will do their utmost to help in this nation-wide attempt to control the disease, in order to save the heavy losses mentioned at the beginning of the article.

PLANTS AND PROBLEMS XIII

A GOOD GARDEN PLANT

Question. When I visited Wisley a year or two ago I was impressed by a single, large-flowered, white rose in your borders. Please, can you tell me something about this attractive plant? Its absence from gardens generally makes me fear that it must be prone to damage from all sorts of pests and diseases.

Answer. The plant you saw in our border was Rose (Hybrid Tea) 'Innocence.' For many years this variety has grown magnificently on our poor, light soil and, despite the inevitable neglect of its meagre cultural requirements during the years of the war, the plant has always

remained singularly free from pests and diseases. However, after nearly thirty years the stock grew weak and the variety has been removed.

The reason for its absence from most gardens is certainly not due to any cultural difficulties as our experience will testify. Nearer the truth, in all probability, is the suggestion that gardeners have changed their ideas; nowadays such plants as a white-flowered Hybrid Tea are seldom sought albeit some such varieties are the most accommodating of garden plants.

POOR GROWTH OF A YEW HEDGE

Question. For some while an old yew hedge in our garden has not made the growth it used to do and it is getting thin at the base. The gardener suggests it needs feeding. Would you please confirm this and make appropriate recommendations if necessary?

Answer. In all probability the yew hedge does need feeding—a point which is often overlooked until it is too late to do anything about it. If animal manure is available, a thick surface dressing can be applied in the early spring. Alternatively, a dressing of equal parts of bone meal and hoof and horn meal can be lightly forked into the surface of the soil at a rate of 3 ozs. per sq. yard and this followed by an application of compost or leafmould. In subsequent years the mixture of bone meal and hoof and horn meal can be repeated annually whichever treatment is given in the first place. Also, in conjunction with the manuring, annual clipping should be "on the light side" until the hedge regains its normal vigour.

SPRING-SOWN ONIONS

Question. In 1954 I had difficulty in harvesting my spring-sown onions due to late growth and damp weather in September and October. I thought that if I sowed the onions earlier I might get better results. Could you tell me what is the earliest I may sow my onions?

Answer. Difficulty in harvesting onions was quite general in 1954 due to the wet weather in September and October. It is not generally known that onions may be sown in late February. The young seedlings are completely hardy and will survive frost even when they are just through the ground. The land should be prepared by digging in November and incorporating a generous dressing of well-rotted manure. Leave the land rough throughout the winter and as soon as the surface dries out in February rake down and get a good tilth before sowing the seed. The drills should be ½ inch deep and 12–15 inches apart; drills which are too deep can cause bull-necked onions to develop. Half an ounce of seed is required for a 50-foot row. It is essential at all stages of growth to keep the ground well cultivated and free from weeds. In late August the tops should be bent over to assist ripening and if growth continues the bulbs should

be gently raised out of the ground with a fork. Suitable varieties for spring sowing include

'Bedfordshire Champion'
'Best of All'
'Flagon.'

AUTUMN-FRUITING RASPBERRIES

Question. I have an established row of 'Lloyd George' raspberries and wish to devote half of them entirely to autumn fruiting. Can you please tell me how to achieve this. I find it confusing that the same variety may be used for both summer and autumn fruiting.

Answer. Summer-fruiting varieties of raspberry fruit on canes produced the previous year. Autumn-fruiting varieties, however, fruit on the tips of the young canes produced earlier in the *same* year. 'Lloyd George' is a variety which if grown for summer fruiting will often be found to fruit on the tips of some of the young canes in the autumn as well. To convert an established row of this variety from summer to autumn fruiting cut all the canes down to within a few inches of ground level in late February or early March. The young canes produced will then fruit during the autumn and these in turn should be cut down the following February–March, and so on. This applies equally to other autumn-fruiting raspberries such as 'Hailshamberry' or 'November Abundance.'

LATE PLANTING OF FRUIT TREES

Question. I have some young fruit trees the planting of which has been, and still is, delayed because my soil is rather waterlogged. Should I plant the trees now or would it be best to wait and run the risk of late planting? I would add that drainage on the land in question is normally quite satisfactory and it is only after exceptional rainfall that it becomes waterlogged.

Answer. To plant any trees in such waterlogged soil is only asking for trouble and it will be much the best thing to delay planting until conditions improve. Although growth may be reduced as a result of late planting the trees should at least establish themselves, and with a much reduced casualty rate. A heavy surface mulch with any humus-forming material is doubly important after late planting to protect the roots from any periods of drought which may occur.

It should be emphasized, however, that where any doubt exists as to whether drainage is adequate it is far better to improve it before planting. If necessary the ground should be properly drained, or, on heavy soils where this is not considered to be essential, the trees can be planted in a very *shallow* hole. The soil is then heaped around the roots so that each tree is virtually standing on a mound and is then less likely to suffer from any waterlogging.

PEACH LEAF CURL

Question. My peaches suffered from leaf curl disease last summer and I wish to spray against this trouble. Is it too late to do this in February?

Answer. The spraying treatment for peach leaf curl disease must be done while the tree is dormant so that it is only a matter of spraying the bare branches and stem. The operation should be carried out before the flower buds burst and this obviously depends on the seasonal weather and on the locality but early February should be safe in most parts of Britain. Lime Sulphur at 1 pint in 2½ gallons of water or one of the copper-containing sprays can be used and if the treatment is done thoroughly it usually is very effective.

VIRUS IN SHALLOTS

Question. I am told the reduction in size of my shallots may be due to a virus. Is this possible?

Answer. A virus disease is known to attack onions, leeks and shallots and this can be serious in shallots because they are propagated vegetatively and so the virus persists and spreads in a stock. An infected shallot plant is much smaller than a virus-free one and its leaves are twisted or crinkled and show faint light green or yellowish streaks. The resulting bulbs are smaller and may not keep so well and you should eliminate such plants and save your sets only from definitely vigorous and healthy plants.

SOFT SCALE ON CITRUS

Question. Can you tell me the cause of the sticky substance which covers the leaves of my orange trees? These are growing in a cold greenhouse where even the floor becomes covered with the substance. I enclose a few leaves for your examination.

Answer. The orange tree is infested with the soft scale insect, *Lecanium hesperidum*: the light brown, oval scales can be seen in large numbers on the underside of the leaves. These and related insects excrete large quantities of honey dew—a sweet, sticky substance. On coating the upper surface of underlying leaves and the floor, it provides a suitable medium for the growth of black fungal sooty moulds. Thus the plant is not only rendered unsightly but the leaves are prevented from functioning normally.

Providing measures are taken to control the pest the honey dew will disappear. Therefore, we suggest the plants should be sponged with D.D.T. miscible (emulsion) diluted according to makers' instructions. Alternatively, the plants may be sprayed with this substance or a nicotine-soap wash, but several applications would be necessary to eradicate the pest.

This insect attacks a wide range of plants under glass including other citrus plants, camellia, figs and vines.

BIG BUD OF BLACK CURRANTS

Question. I am sending herewith cuttings from our black currant bushes and should be obliged if you will inform me whether they have "big bud"; also what is best to be done.

Answer. As you suspect, the black currants are infested by the black currant gall mite, *Phytoptus ribis*, which gives rise to the condition known as "big bud."

It is controlled by applying lime sulphur ($\frac{1}{2}$ pint to 2 gallons water) at the end of March or the beginning of April. In practice a better timing is obtained by spraying at the grape stage, i.e. when the flower buds hang down and resemble a bunch of grapes. The lime sulphur should be applied as a routine spray each year to all black currant bushes whether they are infested or not: in this way infestations may be avoided.

The importance of big bud is not just based on the direct damage which it causes, but also because it is now considered to be the vector of the virus disease known as "reversion"—a disease which seriously reduces cropping.

ATMOSPHERIC POLLUTION CONSIDERED IN RELATION TO HORTICULTURE

A PRELIMINARY ANALYSIS OF THE PROBLEM

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1. INTRODUCTION

THE data given below are a summary of the observations made by the author in Manchester and Sheffield together with the accumulated observations of the Parks Superintendents of the larger industrial towns and cities. Results from the various pollution gauges operated by the Manchester and District Regional Smoke Abatement Committee are also used to illustrate various points. Until these observations are placed on a firmer experimental basis choice of species suitable for polluted areas must be determined, not only by such a plant list as that given below, but also by a consideration of such variables as the soil factor, location and aspect of the site, etc. Except under glasshouse conditions, it is the climatic factor which is least controllable; atmospheric pollution is one of the complex of variables included in this factor.

2. OBSERVATIONS

The pollution problem as it concerns the horticultural practice of public authorities in the larger towns and cities is a local one. It is of

minor importance in Hull, Bristol, Cardiff, Grimsby, Swansea and Northampton, for example, except perhaps in the vicinity of gas and electricity undertakings and alongside railways. It is, however, very important in the more heavily industrialized cities, such as London, Manchester, Birmingham, etc.

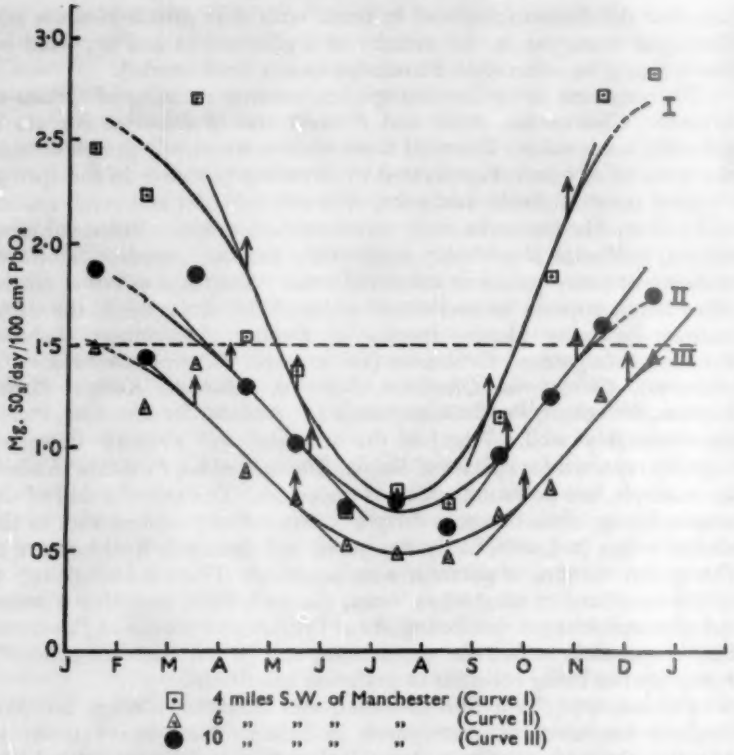
In such industrial centres conifers cannot generally be successfully grown, though how far this is true of the deciduous *Larix* spp. is uncertain. *Taxus baccata*, *Chamaecyparis lawsoniana*, *Juniperus communis* and *Cupressus macrocarpa* are adversely affected, *Taxus* apparently being the most tolerant of industrial atmospheres. *Ilex aquifolium*, the holly, is not regarded as satisfactory; because of reduced growth and the unaesthetic appearance of accumulations of soot, etc., on its leaves, it has been replaced in Burnley by *Laburnum* sp. It tends to become deciduous in the more heavily polluted parts of Sheffield and other towns. This replacement of a normally evergreen habit by a deciduous one occurs also with a number of other species, notably *Ligustrum lucidum*, one of the best of the privets. The fruiting of some berried shrubs, of *Aesculus* spp., of *Castanea dentata*, etc., is said to be reduced by heavily polluted atmospheres, but this point needs closer examination. This has a bearing on the economics of fruit growing in and near large centres of population. There are confirmatory reports of the adverse effects of atmospheric pollution upon Hybrid Tea and Polyantha roses, especially on the latter; in Bolton these have to be replaced after 3–5 years. The following species are to varying degrees similarly suspected of susceptibility: *Lonicera nitida*, *Buddleia globosa*, *Atriplex halimus*, *Azara microphylla*, *Lavandula* spp., the shrubby species of *Potentilla*, *Rosmarinus officinalis*, *Santolina chamaecyparissus*, *Veronica anomala*, *V. brachysiphon* and *V. parviflora*, *Streposolen jamesonii* and *Euphorbia pulcherrima* (the last two under glass). Azaleas and other species of *Rhododendron* are apparently susceptible and the same is probably true of other ericaceous species. Some rhododendrons, however, undoubtedly grow under conditions of heavy pollution, but the deposition of soot, etc., on the leaves and flowers detracts from their appearance; their vegetative growth is often restricted.

Appendix I lists the trees and shrubs commonly grown with an apparently satisfactory degree of success in towns and cities which have a pollution problem. Those marked (**) are particularly tolerant while those marked (*) may be successful only in the suburbs. About one-third of the shrubs are evergreen; how far this remains true under conditions of atmospheric pollution is uncertain. All the trees are deciduous and, roughly speaking, those capable of fairly rapid growth (*Populus* sp., for example) and of producing new shoots fairly readily if damaged, are most tolerant. But even apparently tolerant trees may, under conditions of pollution, exhibit a marked earliness of autumn leaf fall (COHEN and RUSTON in 1912 commented on this feature of *Fraxinus excelsior* in Leeds). More obvious symptoms of pollution damage are the scorching and browning of leaf margins and, in extreme cases,

complete defoliation (observed to occur with *Acer pseudo-platanus* and *Crataegus monogyna* in the vicinity of a glass works and reported by PEACE (1953) to occur with *Pterocarya* near a brick works).

Turning next to herbaceous species, autumn planting of species of *Myosotis*, *Cheiranthus*, *Bellis* and *Primula* and of *Dianthus barbata* is generally inadvisable. Plants of these species are mostly grown outside the town or city and transplanted to flowering positions in the spring. *Alyssum saxatile*, *Arabis caucasica*, *Aubrieta deltoidea* and some species of *Viola* are likewise more easily overwintered in less-polluted suburbs; indeed, pollution is probably responsible for the complete failure of *Aubrieta* at many points in industrial areas. *Saxifraga umbrosa*, on the other hand, appears to overwinter successfully. In general, the usual summer-flowering plants—species of *Dahlia*, *Antirrhinum*, *Lobelia*, *Petunia*, *Pelargonium*, *Centaurea* (for example *C. gymnocarpa* and *C. cineraria*), *Calceolaria*, *Gladiolus*, *Nemesia*, *Abutilon*, *Kochia*, *Heliotropium*, *Nicotiana*, *Perilla*, *Campanula* (*C. medium*, for instance), etc.—do reasonably well. Whether the stunting and reduced flowering capacity reported for species of *Salvia*, *Zinnia*, *Dahlia*, *Picris* and *Kalmia* for example, are pollution effects is uncertain. Towards the end of the season foliage often becomes dirty in town and city centres and, in the case of tulips in Leeds, badly disfigured and damaged; in the centre of Derby leaf margins of geraniums are scorched. There is a single report of the unreliability of *Althaea rosea*, the hollyhock, in polluted atmospheres; opinions are conflicting about hybrids and species of *Penstemon* but *Tropaeolum majus*, the nasturtium, and its varieties are generally recognized as being resistant to pollution conditions.

Begonia spp., both fibrous-rooted and tuberous species, are particularly intolerant of atmospheric pollution. Near heavy traffic in London, the tuberous forms drop all their flowers in the coloured bud stage. In Manchester begonias are stunted and will not grow at all in the middle of Sheffield. Winter-flowering begonias are notorious also for abscission both of petals and flowers and during periods of heavy fog and *Coleus* species are especially liable to leaf abscission both out-of-doors and in the greenhouse. Cinerarias are also susceptible and suffered particularly acute damage in the 1952 November fogs in London (for meteorological conditions during these fogs, see PARKER, 1953), with wilting and scorching of the foliage. Besides cinerarias and species of *Coleus* and *Primula*, species of *Kniphofia*, *Lychnis*, *Meconopsis*, and *Androsace* also suffered. METCALFE (1953) reports the blackening and death of buds and flowers of certain orchids, notably *Calanthe*, and considers that reduction in availability of light is not the prime cause. In glasshouses susceptibility to damage by fog during winter is reported also for *Primula malacoides* and for species of *Helichrysum*, *Schizanthus*, *Iresine*, and for *Fuchsia*, *Calocephalus brownii* and for varieties of *Pelargonium zonale*. *Cyclamen persicum* proves a difficult plant to flower within a mile or so of Leeds town centre. Such reports need some confirmation. So does the general observation that herbaceous tropical



TEXT FIG. 1—Monthly averages for sulphur dioxide concentrations obtained with the standard D.S.I.R. apparatus (data kindly supplied by The Manchester and District Regional Smoke Abatement Committee).

plants exhibit a more marked susceptibility to fog damage than do other plants.

There is no doubt as to the ability of *Poa annua* to thrive under conditions of heavy pollution; it makes with *Festuca* spp. 50 per cent. of the mixture used in sowing playing fields at Salford. COHEN and RUSTON (1912) compared lettuce and radish grown near the centre of Leeds with plants grown in the suburbs on plots of the same soil; they report marked reductions in yield. BLEASDALE (1950), using the same technique in Manchester, reported yield reductions of S23 *Lolium perenne* and spring cabbage (*Pinus sylvestris* and species of *Myosotis* and *Cheiranthus* were also adversely affected). With lawns, etc., the safest procedure would appear to be the careful selection of suitable grasses growing in and around the area of pollution, for there appears to be little doubt that once the lawn or green is established only careful treatment and suitable fertilizer practice are necessary for continued success.

The roofs of glasshouses in heavily polluted areas need frequent washing; chemical detergents are necessary with old deposits. In one nursery in the most heavily polluted part of Sheffield plants do fairly well under glass only between March and October; even antirrhinums sown before early March are unsuccessful. No doubt by suitable means, such as the installation of supplementary illumination, for example, pollution effects can be alleviated but the results likely to be achieved must always be balanced against costs.

3. RESULTS

Text Fig. 1, is a graph of the monthly results of sulphur dioxide estimations (expressed in mg. SO_3/day/100 cm.^{2} PbO_2 is the standard D.S.I.R. apparatus) for three stations situated approximately 4 (curve I), 6 (curve II) and 10 (curve III) miles S.W. of Manchester city centre. The curves illustrate the following points: (*a*) the seasonal variation of sulphur dioxide concentration and its absolute amount; (*b*) the time of the year at which the sites are subjected to the greatest increase or decrease of sulphur dioxide; (*c*) the variation in the *range* of sulphur dioxide to which each site is subjected; and (*d*) the effect of increasing distance from the pollution centre (assumed to be a single continuous source) on (*a*), (*b*) and (*c*). Results for suspended impurities (smoke) are not available for Manchester sites, but the results obtained in the D.S.I.R. survey of atmosphere pollution in Leicester (1945) show that the curves for the annual cycle of smoke follow the same trends as those for SO_2. The curves in Text Fig. 1 can therefore be taken to indicate the annual trend, for the three sites, not only of SO_2 but also of smoke.

It follows from Text Fig. 1 that species planted in March are exposed to a relatively high but decreasing amount of SO_2 and smoke during the early stages of their development; species which flower, fruit, etc., after the end of August are subjected to a marked and relatively rapid increase in SO_2 and smoke. Short-lived annuals completing their life-cycle between the end of May and mid-September avoid not only the most marked fluctuations in amount of SO_2 and smoke but also the most rapid rate of change in this amount. If the life-cycle of a species extends beyond these time limits the early and/or late phase of its developmental cycle must be proportionally tolerant to these variables. The more heavily polluted the site the shorter, apparently, is the time period for obtaining best results. Therefore, for sites where pollution effects are suspected, earlier planting rather than later, or earlier maturing species rather than later maturing, are to be recommended. Similarly, of the perennials which overwinter either below ground or in a deciduous condition above ground, those which break dormancy after mid-March and complete their annual developmental cycle by mid-September or earlier are to be recommended. Those biennials and evergreen perennials which overwinter above ground in a leafy condition (wallflowers, for example, and evergreens such as conifers, holly, etc.) are obviously exposed not only to the most marked climatic

variation but also to one or more SO_2 and smoke cycles, the effects of which may or may not be cumulative.

Finally, regarding the spatial rather than the temporal distribution of SO_2 and smoke, Text Fig. 1, illustrates the effects of increasing distance from the pollution source upon level of pollution. Three sorts of site can be envisaged: those where the amounts of SO_2 and smoke produce deleterious effects on species throughout the whole or greater part of the year, those where no effects are observable and those intermediate in these respects. Thus, if we defined a botanically clean atmosphere as one in which the monthly SO_2 did not exceed 1·5 of the units used in Text Fig. 1, site III would be free of pollution effects, site II would show effects on susceptible overwintering species (November to April), and site I would show effects on susceptible species between October and May. There is, in other words, a spatial as well as a temporal oscillation of atmospheric pollution. Those species are most likely to succeed whose tolerances to pollution throughout development are most nearly in phase with the pollution cycle occurring.

4. GENERAL DISCUSSION

Considered in relation to plants, atmospheric pollutants can be somewhat arbitrarily subdivided into (i) those potentially incapable, and (ii) those potentially capable, of entering the plant either through leaf stomata (and possibly lenticels) or indirectly by way of the soil. To group (i) we would allocate those solid, suspended impurities insoluble in water; they are usually defined by the term "smoke" and include soot, ash, grit, etc. To group (ii) we would allocate the gases listed under the Alkali, etc., Works Regulation Act, 1906, as being "noxious and offensive": they number some thirty or more. The extent of this list emphasizes the complexity of the problem and the difficulty (*a*) of assigning pollution damage to plants to any specific chemical or physical entity and (*b*) in many instances of placing the onus for such damage on any particular industry except where this is sufficiently isolated to warrant suspicion. Note too that the permissible concentrations of pollutants allowed to pass to the atmosphere are, as far as botanical and horticultural considerations are concerned, to a large extent arbitrary, and raise the problem of defining a satisfactorily clean atmosphere from a botanical standpoint. Nor is the problem solved by the experimental determination of the pollution tolerance limits of the species concerned for the effects of varying topography, aspect, etc., have also to be considered. Further complexity is introduced by the fact that other, at present often unknown, pollutants are formed indirectly by chemical or physical processes taking place in the air after emission and probably involving either all, or any two, of the phases solid, liquid and gaseous (see, for example, HULL and WENT, 1952).

It will be apparent from the above that the tendency to regard all pollution damage to plants as attributable to SO_2 alone is to be treated with some scepticism. But effects such as those described above

might still possibly be so attributed, even if only in part. It is therefore necessary to ascertain the part played by SO_2 in (*a*) causing or accelerating abscission of flowers (as of begonia, for example) and of leaves (of deciduous trees but more especially of normally evergreen, woody perennials and of *Coleus* spp.); (*b*) causing damage, possibly by reinforcing the effects of winter conditions, to species, chiefly biennials, which overwinter above ground in a leafy condition (spring cabbage, wallflower, etc.); and (*c*) bringing about reductions in yield (as of perennial ryegrass, for example) and possibly in flowering and fruiting capacity of certain species—suspected consequences of pollution which, however, need confirmation.

(*a*) implies consideration of a specific effect, rather than a more general metabolic effect, such as that which reduction of growth, of yield or of fruiting capacity implies. MYERS (1940) lists a number of widely differing conditions which cause or accelerate leaf abscission in *Coleus*. The possible addition of SO_2 to this list would perhaps, therefore, not be unexpected. The change from an evergreen to a deciduous habit is perhaps more unique. In view of the theoretical interest of the ethylene-auxin hypothesis of leaf abscission (see, for example, BARLOW (1952), GAWADI and AVERY (1950), etc.), experiments designed to assess the role of SO_2 and other pollution variables should be carried out. With regard to (*b*) the possibility of interaction of pollution and other climatic conditions has to be considered. A consideration of (*c*) immediately involves the question whether SO_2 acting alone can cause damage (such as reduction in yield) without there being visible lesions produced on the leaves. That such damage occurs has been repeatedly denied (by KATZ (1949), for example). After the appearance of leaf lesions, reduction in yield (for example, of alfalfa) is reported as being proportional to the amount of leaf damage so caused (HILL and THOMAS, 1933). These results are interpretable as due to SO_2 being presented either for too long or at too high a concentration to enable it to be converted to some less injurious sulphur compound; increasing SO_2 above this threshold produces increased bleaching and damage of the leaves. The proponents of the "invisible injury" theory seek to establish that metabolic disturbance results from the application *throughout the life of the plant* of sublesionary concentrations of SO_2 and that such effects are, in fact, cumulative. It is obviously necessary to decide first on a reasonable definition of "invisible injury"—say, reduced flowering capacity for summer bedding plants, for example, reduction in yield or merely alteration in the average content of the major chemical constituents of the grain for barley, earliness or increased rate of leaf abscission for trees and shrubs, etc. In view of this practical necessity for altering the criterion of "invisible injury" to suit the species, it will be apparent that any general statement which denies absolutely the possibility of such effects (such as that of KATZ, 1949), is perhaps somewhat premature. At the same time it may be said that the "invisible injury" theory is, at best, of doubtful value: the effect produced by SO_2 on each

species should be considered on its merits without recourse to such a "negative" hypothesis.

Finally, though outside the scope of this discussion, the results of the possible cumulative effects of SO_2 (and possibly other pollutants) upon the distribution and success of such species as bracken, heather, etc., is not to be overlooked. Thus CONWAY (1949) suggests that the dominance of *Eriophorum vaginatum* over much of the S. Pennine uplands has probably been achieved because of its tolerance of pollution conditions.

ACKNOWLEDGMENTS

PROFESSOR S. C. HARLAND and DRS. H. E. STREET and P. F. WAREING have kindly commented on the text. To them, to the many Parks Superintendents and others who have contributed information and to MR. C. HAY of the Manchester Smoke Abatement Committee for many kindnesses, I am grateful.

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APPENDIX I

Trees and shrubs reported to be tolerant of atmospheric pollution.

TREES

****Acer* spp.**
Aesculus carnea
A. hippocastanum
****Ailanthus altissima*
****Betula pendula*
Carpinus betulus
****Catalpa bignonioides*
C. ovata
****Crataegus prunifolia*
****Fraxinus excelsior*
****Gingko biloba*
***Liriodendron tulipifera*
Magnolia acuminata
M. kobus
Mespilus germanica
Morus nigra

TREES—(*contd.*)

****Platanus aurifolia*
****Populus nigra* (and var. *betulifolia*)
Prunus avium
P. amygdaloides
P. serrulata
****Rhus typhina*
****Robinia pseudoacacia*
Salix spp.
Sorbus aria
****S. aucuparia*
Tilia euchlora
****T. europea*
T. platyphyllos
Ulmus carpinifolia
U. procera

SHRUBS

***Amelanchier canadensis*
Aralia chinensis
****Aucuba japonica*
****Berberis darwinii*
****B. stenophylla*
B. thunbergii (var. *atropurpurea*)
Buddleia davidi
Buxus sempervirens
Ceanothus delilianus
Ceratostigma willmottianum
Cercis siliquastrum
Chaenomeles japonica
C. lagenaria
Cistus ladaniferus
****Colutea arborescens*
C. media
***Cornus alba*
Cotoneaster frigida
C. lactea
C. salicifolia (and var. *flocculosa*)
C. simonsii
***Cytisus scoparius*
Daphne mezereum
Deutzia scabra
Euonymus fortunei
E. japonicus
****Fatsia japonica*
****Forsythia intermedia* (and var. *spectabilis*
Hedera helix (and vars.)
Hibiscus syriacus
Hydrangea macrophylla
Laburnum alpini
L. alpini × *anagyroides* (= *L. vossii*)
Ligustrum lucidum
L. ovalifolium
Lycium chinense
Magnolia × *soulangiana*
Mahonia aquifolium
****Olearia haastii*
Pernettya mucronata
Philadelphus grandiflorus
P. 'Virginal'
****Prunus laurocerasus*
****Pyracantha coccinea*
Rhododendron spp.
Ribes aureum
****R. sanguineum*
R. sanguineum × *odoratum* (= *R. gordonianum*)
****Sambucus nigra* (var. *aurea*)
Skimmia japonica
***Sorbaria aitchisonii*
Spartium junceum
Spiraea thunbergii
***S. menziesii*
Stranvaesia davidiana
Symphoricarpos albus
***Syringa vulgaris*
Tamarix tetrandra
Ulex europaeus
****Viburnum opulus*
V. rhytidophyllum
***V. tinus*
****Vinca minor*
V. major
Wiegelia florida

WISLEY TRIALS, 1954

PERENNIAL LUPIN

The Council of The Royal Horticultural Society has made the following awards to Perennial Lupins after trial at Wisley, on the recommendation of a sub-committee of the Floral Committee A. The number in brackets after the description of the variety was that under which it was grown in the trial.

CHARMAINE. (Raised, introduced and sent by Messrs. Bakers Nurseries Ltd., Codsall, Wolverhampton, Staffs.) **F.C.C.** June 10, 1954.—Described R.H.S. JOURNAL 78, p. 389 (**A.M.** 1953). [8]

GEORGE RUSSELL. (Raised by Mr. George Russell, introduced and sent by Messrs. Bakers Nurseries Ltd.) **A.M.** June 10, 1954.—Plant vigorous, not woody; foliage large, medium green; spike 28 inches long, 2½ inches diameter at base; standards opening Begonia (H.C.C. 619/2) changing to Phlox Pink (H.C.C. 625/1), blotch of cream changing at extreme base to Amber Yellow (H.C.C. 505/1); wings opening Begonia (H.C.C. 619/2) changing to Neyron Rose (H.C.C. 623/1) with veining of Neyron Rose (H.C.C. 623). [33]

LADY FAYRE. (Raised, introduced and sent by Messrs. Bakers Nurseries Ltd.) **A.M.** June 10, 1954.—Described R.H.S. JOURNAL 77, p. 26 (**H.C.** 1951). [29]

LILAC TIME. (Raised, introduced and sent by Messrs. Bakers Nurseries Ltd.) **A.M.** June 10, 1954.—Described R.H.S. JOURNAL 78, page 389 (**H.C.** 1953). [23]

SWEET PEA

One hundred and eight stocks of Sweet Peas were received at Wisley in the autumn of 1953. These, with thirty-two control varieties, were sown in boxes on October 12, 1953. They were potted into 3-inch pots on November 16 and placed in cold frames for the winter. They were gradually hardened off and planted out on March 16, 1954. The trial was divided into two sections: (a) natural grown on hazel sticks; (b) cordon grown on bamboo canes. The natural grown section was planted on the Floral Trial Grounds and the cordon grown section on the Vegetable Trial Grounds. In the winter of 1953–1954 both sites were double dug incorporating a generous dressing of farmyard manure and base dressing of bone meal at the rate of 2 ounces per square yard was applied before planting.

The Joint Sweet Pea Committee of The Royal Horticultural Society and the National Sweet Pea Society inspected the trial on July 1, 1954 and on its recommendation the following awards have been made jointly by The Royal Horticultural Society and the National Sweet Pea Society.

The measurements given are those taken from plants in the cordon grown section of the trial. The number in brackets after the description of the stock was that under which it was grown in the trial.

DAINTY MISS. (Raised and sent by Mr. P. Simons, Lyndhurst Nurseries, Ardleigh, Colchester, Essex.) **A.M.** July 1, 1954. Plant vigorous; flower stem 18 inches long, stiff, with an average of four flowers per stem. Flower 2 inches across, 1½ inch deep, large, waved, buds cream opening to cream ground flushed with a delicate shade of pink near Venetian Pink (H.C.C. 420). [E.4]

JOYCE. (Raised and sent by Messrs. W. J. Unwin Ltd., Histon, Cambridge.) **A.M.** July 1, 1954.—Plant vigorous; flower stem 15 inches long, very stiff, with an average of four flowers per stem. Flower 2 inches across, 1½ inch deep, large, waved, Cobalt Violet (H.C.C. between 634/3 and 634/2) flushed with Mauve (H.C.C. 633/1) [B.16]

TOPPER. (Raised and sent by Messrs. Robert Bolton & Son, Birdbrook, Halstead, Essex.) **A.M.** July 1, 1954.—Plant vigorous; flower stem 15 inches long, stiff, with an average of four flowers per stem. Flower 1¾ inch across, 1½ inch deep, large, slightly waved, Scarlet (H.C.C. 19/2) overlaid with Signal Red (H.C.C. 719/3). [C.11]

SHIPLAKE. (Raised and sent by Messrs. Sutton & Sons, Ltd., The Royal Seed Establishment, Reading, Berks.) **H.C.** July 1, 1954.—Plant vigorous; flower stem 18 inches long, stiff, with an average of four flowers per stem. Flower 2 inches across, 1½ inch deep, large, slightly waved, cream ground heavily flushed Neyron Rose (H.C.C. between 623/1 and 623) slightly paling towards the edges of the petals. [D.12]

BEARDED IRIS

The Royal Horticultural Society and the British Iris Society have made the following awards to Bearded Irises after trial at Wisley, on the recommendation of the Joint Iris Committee.

The number in brackets after the description of the variety was that under which it was grown in the trial.

ALFRED EDWIN. (Raised, introduced and sent by A. T. White Esq., Aldbury, Oaklands Avenue, Oxley, Hertfordshire.) **A.M.** June 8, 1954. Plant vigorous, erect, rapid increase; foliage 24 inches long, glaucous green. Flowering stems 30–32 inches high, very erect, straight, five-flowered. Flowers well proportioned, medium size. Standards 3½ inches long, 2 7/16 inches wide, cupped and slightly arching, Mimosa Yellow (H.C.C. between 602/1 and 602/2) with brown striations at extreme base. Falls 3¾ inches long, 2½ inches wide, flaring, white tinged Canary Yellow (H.C.C. 2/2) at haft. Style and crest same colour as standards; beard orange. Flowering from June 2, 1954. [55]

PIERRE MENARD. (Raised by Miss Eva Faught, U.S.A., sent by H. J. Randall Esq., C.B.E., Sandilands, Brooklyn Road, Woking, Surrey.) **A.M.** June 17, 1954. Plant vigorous, erect, rapid increase; foliage 24 inches long, glaucous green. Flowering stems 36–40 inches high, erect, straight, six-flowered. Flowers well proportioned, stiff, large. Standards 4⅛ inches long, 3 inches wide, cupped, tips slightly adpressed, Aster Violet (H.C.C. between 38 and 38/1) shot with Amethyst Violet (H.C.C. 35/1). Falls 4⅛ inches long, 3⅛ inches wide, flaring, Aster Violet (H.C.C. between 38 and 38/1) changing at base of petal to Victoria Violet (H.C.C. 738/3). Style broad, whitish mauve, mid rib violet; crest pale violet; beard bright yellow. Flowering from June 14, 1954. [140]

BOOK NOTE

"New Concepts in Flowering-plant Taxonomy." J. Heslop-Harrison; viii + 135 pp. 10 text figs. (Heinemann.) 6*s*.

One of the most obvious needs in technical botanical literature recently has been for a concise and up-to-date account of that somewhat ill-defined area of study known to most British workers as "experimental taxonomy." Dr. (now Professor) Heslop-Harrison's little book fills this gap admirably. Flowering-plant taxonomy, or "the study of the principles and practice of classification" (to adopt the author's introductory definition) has undoubtedly received a tremendous impetus in recent years, largely through the pressure of the new experimental science of genetics; the value of certain of the traditional methods of taxonomists has been questioned, and explanations have been found for many of the traditional difficulties in the classification of so-called "critical groups" of genera and species. In such a situation any attempt to survey the whole field and draw together the many "loose ends"—not least in a rapidly expanding and changing terminology—is clearly of value; when it is done so competently by so well qualified a person as Professor Heslop-Harrison, other workers should be doubly grateful.

The book opens with an excellent historical review of the growth of "orthodox" taxonomy, and the impact of evolutionary theory, and sets the modern scene. Then follow separate chapters on aspects of variation, with emphasis upon the natural population unit, on the relationship of cytology to taxonomy, and a discussion of the experimental categories and their terminology. The final chapter assesses the present relationship between "orthodox" and "experimental" taxonomy, and suggests a *modus vivendi*.

There is a useful glossary and index; the list of books for further reading is necessarily selective, but it is perhaps unfortunate that Stebbins' recent (1950) comprehensive book, *Variation and Evolution in Plants*, which contains a first-class bibliography listing most of the important European as well as the American work, has been omitted. Admittedly, Stebbins is not a book many students could easily afford—or digest *in toto!*—but it is invaluable for reference, and should at least be available in every botanical library.

Textual errors seem to be commendably few; but perhaps one might register a slight protest against the (consistent) use of "adap*t*ative" for "adaptive"—a usage for which it is difficult to find justification. The definitions of "deme" and "population" (pp. 29, 105 and glossary) might well also cause some eyebrows to be raised among those who have been much concerned with the discussions on this suggested new terminology.

One should not pretend that a book of this calibre is suitable for the interested amateur with little knowledge of cytology and genetics. It would nevertheless reward any one who is prepared to make some effort to keep abreast of modern thought; and is ideally suited both to the pocket and the capabilities of the student reading botany at the University. Teachers of sixth-form biology should also find the book invaluable.

S. M. WALTERS

ERRATUM

Vol. LXXIX, Fig. 165, December, 1954. It is regretted that the caption to Figure 165 is incorrect. This should read:—*Lilium Davidi* F.C.C. July 13, 1954, shown by The Director, Royal Botanic Gardens, Kew, and not *Lilium* 'Kelmarsh' A.M. July 13, 1954.

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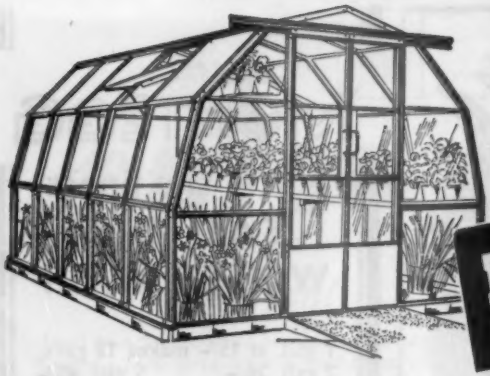

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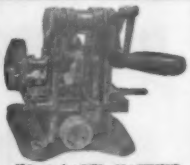

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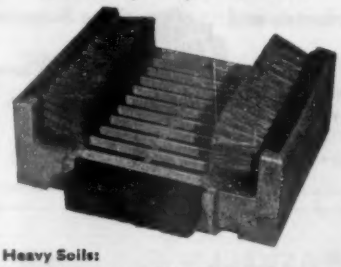

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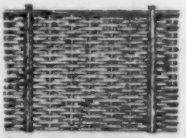

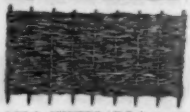

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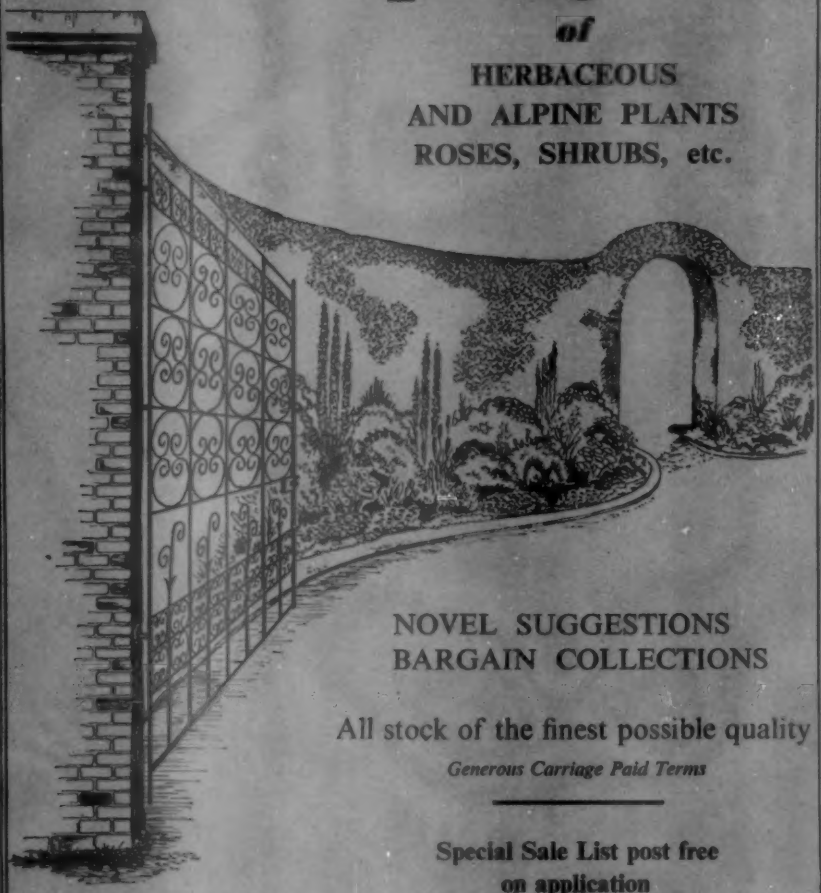

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